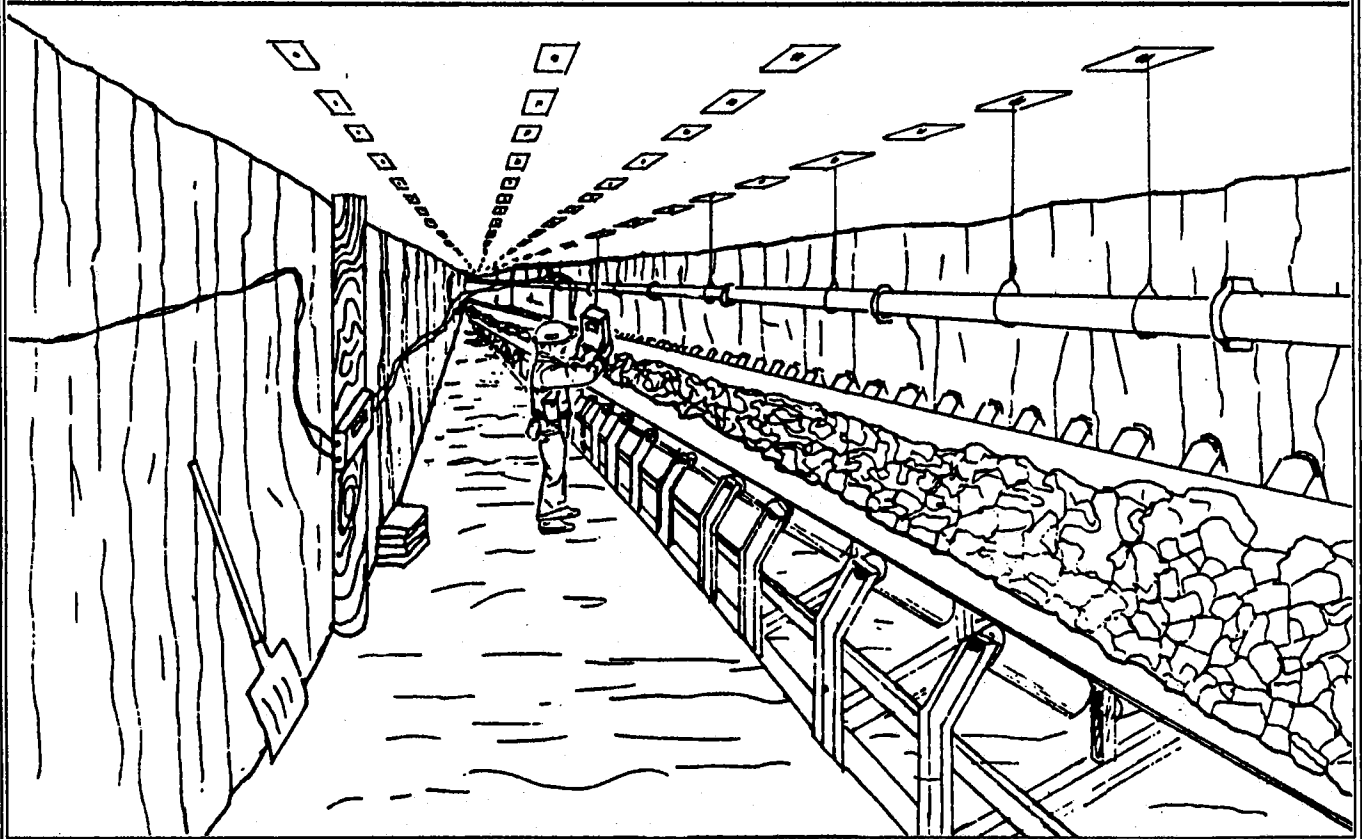


FINAL REPORT
of the
DEPARTMENT OF LABOR'S
ADVISORY COMMITTEE
on the
USE OF AIR IN THE BELT ENTRY TO VENTILATE
THE PRODUCTION (FACE) AREAS OF UNDERGROUND
COAL MINES AND RELATED PROVISIONS
(BELT AIR ADVISORY COMMITTEE)



The Honorable Lynn M. Martin
Secretary of Labor
Washington, D.C. 20210

Dear Madam Secretary:


We are pleased to transmit to you the Report of the Advisory Committee on the Use of Air in the Belt Entry to Ventilate the Production (Face) Area at Underground Coal Mines and Related Provisions.


The report, which is the final product of the Advisory Committee that you established in June of 1991, contains the Committee's consensus recommendations. These recommendations are the result of many hours of discussion and debate and reflect our best judgement on how to ensure the safety and health of our nation's coal miners.

We believe that the recommendations contained in this report are worthy of serious and immediate attention by the Department.

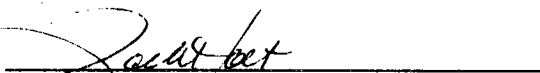
Sincerely,


Dr. Mary Jo Jacobs, Chairperson


Dr. Ragula Bhaskar



Ms. Shirley K. Clark


Ms. Dianne M. Doyle-Coombs


Mr. Jack Holt


Dr. Raja V. Ramani


Dr. Lee W. Saperstein


Mr. John W. Stevenson, Alternate, Non-voting Member

EXECUTIVE SUMMARY

The Advisory Committee on the Use of Air in the Belt Entry to Ventilate the Production (Face) Area at Underground Coal Mines and Related Provisions was established by the Honorable Lynn Martin, Secretary of Labor on June 17, 1991. The Belt Air Advisory Committee was chartered to ". . . review MSHA's belt entry air proposal, including related provisions and other technical data." The Charter charged the Committee to make consensus recommendations, to the extent possible, with respect to;

- 1) The conditions under which belt haulage entries could be safely used as intake aircourses to ventilate working places;
- 2) Minimum velocities in conveyor belt haulageways; and
- 3) Ventilation of escapeways.

The Advisory Committee met for 14 days over a six-month period. After reviewing an extensive amount of material and hearing presentations by a number of experts in mine ventilation, and related fields (e.g., rock mechanics), the Advisory Committee reached several recommendations. The Advisory Committee concluded that regulations should be promulgated by MSHA to 1) specify the conditions under which air in the conveyor belt haulage entry can be used to ventilate working places, 2) require a minimum velocity for air in the conveyor belt entry, and 3) assure the integrity of the mine atmosphere in the primary escapeway. The Advisory Committee expects that, in drafting regulations in these areas, the Agency will be guided by the recommendations developed by the Advisory Committee.

Among the recommendations relative to the use of air in the conveyor belt haulage entry are the following:

Belt haulage entries can be safely used as intake aircourses to ventilate working places provided additional safety and health conditions are met. Those conditions include: a reliable and properly specified, installed, calibrated, and maintained Atmospheric Monitoring System; appropriate training; and an increased emphasis on housekeeping in belt haulageways.

Alerts and alarms should automatically activate at 5 ppm and 10 ppm carbon monoxide above ambient, respectively. The MSHA District Manager could require lower levels based on specified criteria.

Velocity limits (minima and maxima) in conveyor belt haulageways should be based on methane layering and dust entrainment, with a minimum velocity of 50 feet per minute where Atmospheric Monitoring Systems are installed.

The concentration of respirable dust in a belt conveyor haulageway used to ventilate a working place should not exceed 1.0 mg/m^3 at a point just outby the section tailpiece.

The Advisory Committee places strong emphasis on the need for providing miners with adequate alternate escape routes for use during emergencies. The Committee makes, inter alia, the following recommendations:

Ventilation systems should be designed and maintained to protect the integrity of the mine atmosphere in the primary escapeway. A positive pressure differential should be maintained from the primary escapeway to adjacent entries, to the extent feasible and practicable.

Without precluding the use of a return entry or the consideration of other factors such as clearance and ground control in the choice of escapeway ventilation, the alternate escapeway should preferably be ventilated with intake air.

Information submitted for ventilation plan approval should include substantiating data relative to the integrity of the mine atmosphere in the escapeways under normal and pressurized conditions.

Lifelines should be installed in both the primary and alternate escapeways.

The Advisory Committee also strongly recommends that MSHA develop approval criteria for the following:

Conveyor belting material installed in all underground coal mines; and

Atmospheric Monitoring Systems.

During the course of its deliberations, the Committee identified several areas where it feels additional research is warranted. These areas include the following:

An update of information relative to the toxic and other health effects related to exposure to the products of combustion from various conveyor belt materials.

The availability and reliability of AMS detectors for products of combustion, other than carbon monoxide and smoke, generated at low levels by fire-resistant belt frictional heatings and combustion (e.g., HCl).

Discriminating sensors for use in mines using diesel equipment.

The relationship between the location of devices used to pressurize the primary escapeway and their operational characteristics.

A review of the practices used by mines that have demonstrated high standards in dust control and have a low incidence of citations for maintenance and dust control along conveyor belt haulageways.

An evaluation of historical research in current mining systems with belts in returns to determine the advantages and/or disadvantages of each system in regard to protecting air quality within primary escapeways.

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BOM RI 9380

REPORT OF THE ADVISORY COMMITTEE ON THE USE OF AIR
IN THE BELT ENTRY TO VENTILATE THE PRODUCTION (FACE) AREA
AT UNDERGROUND COAL MINES AND RELATED PROVISIONS

I. INTRODUCTION

The Advisory Committee on the Use of Air in the Belt Entry to Ventilate the Production (Face) Area at Underground Coal Mines and Related Provisions (BAAC) was established by the Honorable Lynn Martin, Secretary of Labor on June 17, 1991. The BAAC was formed in accordance with the provisions of the Federal Advisory Committee Act (FACA) and sections 101(a) and 102(c) of the Federal Mine Safety and Health Act of 1977 (Mine Act), and was chartered under the provisions of FACA. (See the Advisory Committee Charter, included as Appendix A of this Report; and the Federal Register Notice of Establishment of Advisory Committee (56 FR 27034, June 12, 1991), included as Appendix B of this Report).

Nominations for Advisory Committee membership were solicited by the Mine Safety and Health Administration (MSHA). As required by section 102(c) of the Mine Act, a majority of the Advisory Committee members were individuals who had no economic interest in the mining industry and who were not operators, miners, or officers or employees of the Federal Government or any state or local government. The Advisory Committee operated as an eight-member group: one member represented labor (another labor representative withdrew shortly before the first meeting), two members represented industry (one of these served as a non-voting alternate), and five members were not affiliated with either labor or industry and had no economic interest in the mining industry or governmental affiliations.

The members selected to serve on the Advisory Committee provided a wide range of collective experience and expertise. A list of the members is provided here with an identification of the interests each represented. Appendix C of this Report provides a summary of the background of each member of the Advisory Committee.

In making its recommendations to the Secretary, the Advisory Committee was asked to review MSHA's proposed rule on the use of belt-entry air in underground coal mines as well as other data and information it considered relevant. Extensive material was requested by the Advisory Committee during its deliberations and was provided, primarily by MSHA. See Appendix D of this Report for a list of materials provided to the Advisory Committee. In

addition, speakers having technical expertise in mine ventilation and other pertinent areas presented information and responded to questions by members of the Advisory Committee. The Advisory Committee is particularly indebted to the miners at the Jim Walter Resources No. 3 Mine who provided valuable information during the Committee's visit and to the members of the public, including both labor and industry, who attended the Committee meetings and demonstrated a genuine interest in the health and safety of the nation's miners. Staff experts from MSHA, the Bureau of Mines (BOM), and The National Institute for Occupational Safety and Health (NIOSH), were present at each meeting to assist the Advisory Committee as necessary. Panels assembled from atmospheric monitoring system (AMS) manufacturers and belt manufacturers addressed the Advisory Committee on health and safety concerns related to their products.

The Advisory Committee met for a total of 14 days during a six-month period. It obtained a "first hand" view of AMS and belt air ventilation by visiting the Jim Walter Resources #3 Mine near Birmingham, Alabama. The visit was made at the invitation of Mr. Jack Stevenson on behalf of the mine operator and provided valuable insight to the Advisory Committee members. The Advisory Committee meetings were conducted by the Chair, Dr. Mary Jo Jacobs. Notice of each meeting was duly published in the Federal Register (FR). Each meeting was open to and was well attended by members of the public. At each meeting, time was made available for members of the public to address the Committee. A verbatim transcript of each meeting was taken and detailed minutes were kept.

In the course of addressing the issues, the Advisory Committee considered a significant amount of data and information. This background material included, inter alia: relevant provisions of the MSHA proposed rule for ventilation standards for underground coal mines; the MSHA "Belt Entry Ventilation Review: Report of Findings and Recommendations" (BEVR) and comments critical of the BEVR; extensive comments submitted during rulemaking and positions taken during petitions for modification by parties critical of the use of belt air to ventilate face areas of underground coal mines; a number of studies conducted by research organizations, primarily the BOM; historical data from MSHA on belt fire incidence and petition for modification submissions; and the MSHA final rule for ventilation standards for underground coal mines, published in May 1992. To enable the Committee to address thoroughly the large volume of material and the wide range of issues, the Advisory Committee established Subcommittees to address AMS, fire safety, training, and escapeways. (See Appendix E.)

A record of Committee activities was maintained and is available to the public. For brevity, this Report is limited to summary documentation and discussions supporting the conclusions and

recommendations and is not meant to be a treatise of the deliberations of the Advisory Committee.

The Belt Air Advisory Committee is composed of the following members:

NONAFFILIATED

Dr. Mary Jo Jacobs, M.D., M.P.H., M.P.P.
Physician, Board Certified for Family Practice
Health Policy Consultant

Dr. Ragula Bhaskar, Ph.D.
Assistant Professor
Mining Engineering
Department of Mining Engineering
University of Utah

Ms. Diane M. Doyle-Coombs
Mining Engineer
Former Chair of Pittsburgh Section,
Society for Mining, Metallurgy and Exploration Inc.

Dr. Raja V. Ramani, Ph.D.
Professor and Head
Department of Mineral Engineering
The Pennsylvania State University

Dr. Lee W. Saperstein, D. Phil.
Professor and Chairman
Department of Mining Engineering
University of Kentucky

LABOR

Ms. Shirley K. Clark
Miner, Equipment Operator
Twentymile Coal Company

INDUSTRY

Mr. Jack A. Holt
Safety Director
CONSOL, Inc.

Mr. John W. Stevenson
General Manager
Ventilation Department
Mining Division
Jim Walter Resources, Inc.
(Non-voting Alternate).

Staff assistance was provided to the Advisory Committee by MSHA. Assistance was also provided by NIOSH and BOM. A list of staff members follows:

MSHA Staff

Mr. Edward J. Miller, Designated Federal Officer
Chief, Ventilation Division
Pittsburgh Safety and Health Technology Center

Mr. Edward Sexauer, Esq.
Office of the Solicitor
U. S. Department of Labor

Mr. Jerry Fuller
Mining Engineer
Denver Safety and Health Technology Center

Mr. Ronald Bethard
Mining Engineer
Birmingham Subdistrict Office
CMS&H District 7

Ms. Roslyn Fontaine
Program Analyst
Office of Standards, Regulations, and Variances

Ms. Darlene Green
Secretary
Office of Standards, Regulations, and Variances

Ms. Tina Haines
Secretary
Office of Technical Support

NIOSH Staff

Mr. John Dower
Industrial Hygienist
Division of Safety Research

BOM Staff

Dr. Fred Kissell, Ph.D.
Research Supervisor
Dust Control and Ventilation Group
Pittsburgh Research Center

II. TASK OF THE ADVISORY COMMITTEE

The Belt Air Advisory Committee (BAAC) was chartered to ". . . review MSHA's belt entry air proposal, including related provisions and other technical data." The Charter continued, with the expectation that the Committee would make consensus recommendations on the following:

- 1) The conditions under which belt haulage entries could be safely used as intake aircourses to ventilate working places;
- 2) Minimum velocities in conveyor belt haulageways; and
- 3) Ventilation of escapeways.

On November 19, 1985, MSHA published a preproposal draft of revised underground coal mine ventilation standards contained in Part 75 of Title 30 of the Code of Federal Regulations (CFR). Included in this draft, inter alia, was a section (75.350) on the use of entries that contain conveyor belts and how they may be used to course ventilating air to the working face. This part of the preproposal eliminated the prohibition against using belt haulage entries to ventilate active working places that was in the extant section 75.326. Following review of the comments received on the preproposal, a proposed rule was published on January 27, 1988 (53 FR 2382), and six public hearings were held. Although questions were raised over many parts of the proposal, a substantial debate arose over the section on belt conveyor entries. Because of this debate, the then Assistant Secretary for MSHA established the BEVR committee in March 1989. The BEVR committee conducted a technical review of the use of so-called "belt entries" (underground coal mine entries that contain a conveyor belt) for purposes of ventilating face areas. This led, in August 1989, to MSHA's publication of the BEVR Report. Subsequent to its publication, another public hearing was held specifically to discuss the findings in the BEVR Report. Again, this hearing, referred to informally as the Reston hearing, generated substantial debate, both oral and written.

In an effort to resolve disputes and facilitate the Agency's development of a final rule, the BAAC was constituted and chartered as described above. In the meantime, MSHA divided the proposed regulatory amendments and on May 15, 1992, promulgated final rules for all parts of the 1988 proposal not within the scope of the Committee Charter of the Advisory Committee (57 FR 20868). This Report, therefore, is advisory to MSHA on the three topics in the Charter. A number of consensus recommendations have been made by the BAAC that are presented in a following section of this Report, which then continues with background and rationale for these conclusions.

Historical Perspective

The issue of belt-entry ventilation is a small piece of a much larger shift that is occurring in underground coal mining, namely the move to high-productivity machinery that is amenable to computer control. Consequently, the laws and regulations that were devised in the late 1960's may not be responsive to these newer production systems. Yet, the industry is under the same broad pressures now as when the Federal Coal Mine Health and Safety Act of 1969 (Coal Act) was passed: To continue improvements in the health and safety of the nation's miners while maintaining the industry's competitive abilities.

Interestingly, the current period is not the first time in modern history that a large jump in coal productivity has occurred: from 1949 to 1969, underground coal worker productivity nearly tripled (0.68 to 1.95 tons per worker hour). Immediately post-1969, worker productivity fell until it reached a low of 1.04 tons per hour in 1978. This fall was due to a number of reasons including rapidly rising coal prices, the mine law, several new environmental laws, and new personnel requirements from collective bargaining agreements. Today, however, productivity stands at 2.54 tons per hour, an all-time high. The BAAC is conscious of the need to foster the conditions that have led to these high productivity rates while being mindful that the industry must assure the safety and health of the miners as its primary consideration.

Changes in the mining industry have often come from technological advancements and enhanced labor output. In 1949, most coal was transported from the face in rail-mounted mine cars that were usually loaded in the face area. Today, most coal is removed by conveyor belts. This is one example of a technological change that has resulted in both improved safety and productivity. The recent introduction of remotely controlled continuous miners and computer-based ventilation systems are other examples. Substitutions of major extraction systems, such as longwall for room-and-pillar mining, is another form of technological progression. Human factors that favor productivity and safety include a stable, experienced work force, and better skills training.

In the period immediately preceding 1969, when the Coal Act was enacted into law, the predominant form of underground mining was room and pillar mining, nearly equally divided between conventional and continuous mining systems. Mechanized longwall was in its infancy in the United States and did not account for much coal production. At that time most safety analyses and production data gathering were done by human observation, assisted by hand-held devices. Since then, there has been a substantial jump in the number of monitoring systems installed in coal mines. The continuously operating methane monitor is an

example of a monitoring system that has been used almost since the passage of the Coal Act. Modern longwall mining has led to the introduction of enhanced monitoring systems for information on production status as well as atmospheric quality and safety considerations. Of late, there has been a rapid expansion in the availability of sensors and monitoring equipment for reporting on environmental, production, electrical, and ventilation systems. Improved telecommunications has allowed these monitoring systems to report to remote locations.

The enactment of the Coal Act and the promulgation of regulations for safe operation of mines are two significant milestones in the annals of world-wide mine health and safety. The provisions of the mine ventilation regulations in particular have had a major impact on coal mine safety, especially in reducing ignitions and explosions and their propagation throughout the mine. The requirements for aircourses, belt haulageways, and escapeways were designed to enhance the safety of the mine from fires in belt entries and increase the chances of escape by providing a smoke-free escapeway. The isolation of the belt entry was specified in section 701-242(c) of Title 52 of the Pennsylvania Statutes. However, that law did not require coursing the belt air directly into the return. The requirements for the isolation of the belt entry from other entries and for coursing the belt air directly into the return create problems in increased mine resistance, mine layout and mine ventilation when the mine entry development is governed by other mining conditions.

As with all regulations, experience and critical examination of the provisions have led to a continuing discussion of their merits. Other methods of ventilation may ensure at least equivalent safety and at the same time provide greater flexibility in escapeway design, ventilation system design and overall mine design. MSHA has been granting petitions for modification of the application of mandatory safety standards dealing with aircourses and belt haulageway, albeit with additional requirements relative to monitoring and maintenance.¹

¹ Section 101(c) of the Mine Act provides in part: "Upon petition by the operator or the representative of miners, the Secretary may modify the application of any mandatory safety standard to a coal or other mine if the Secretary determines that an alternative method of achieving the result of such standard exists which will at all times guarantee the same measure of protection afforded the miners of such mine by such standard, or that the application of such standard to such mine will result in a diminution of safety to the miners in such mine."

The importance of a critical examination of these provisions in the regulations with the objective of developing specific recommendations to the Secretary to further enhance the mine health and safety conditions cannot be over-emphasized.

The increased use of longwall mining units has been seen by some operators as a principal means of increasing productivity while simultaneously decreasing the exposure of workers to roof fall hazards. However, longwall mining requires additional air for ventilation in the face area. The growth in the use of longwalls, along with their increased ventilation requirements, has been accompanied by an increasing number of petitions for modification filed by mine operators to allow belt-entry air to be used at the face.

To be effective, mine safety and health law should be strict enough to control practices that put workers at risk. It should also be sufficiently adaptive to accommodate new technologies that enhance productivity and safety. When the Coal Act was enacted in 1969, Congress was concerned about the increasing use of conveyor belts and the potential for propagation of fires along these belts. Monitoring systems at that time were experimental and still unproven. To provide protection to workers, the law prohibited the use of belt entries to ventilate face areas. The result of this prohibition in some instances was that additional entries were needed and additional rows of pillars had to be left. In some deep reserves, this resulted in decreased stability of the ground due to the superimposed stresses of the added development.

It is recognized that changes in technology and progress in research may warrant the modification of, or additions to, the recommendations submitted by the Advisory Committee. Regulations proposed by MSHA should allow for the necessary flexibility to respond to these changes and at the same time provide at least the same degree of protection for miners mandated by the Mine Act.

III. STATEMENT OF THE PROBLEM

Proper ventilation is necessary to prevent underground mine fires and explosions, oxygen-deficient atmospheres, and accumulations of harmful gases. Ventilation is also the primary method of controlling miners' exposure to respirable dust and thus the development of pneumoconiosis (black lung). Each of these roles must be addressed in determining those conditions under which it is safe to use air in the belt entry to ventilate the working face. A number of other considerations must also be taken into account. They include the following: separation of entries and air leakage; belt entry ventilation; use of appropriate belt material; escapeways; training; maintenance of atmospheric monitoring systems; fire prevention practices; warning times; air velocities; and the possibility of roof falls related to the design of mining systems to accommodate ventilation practices. The use of air in the belt haulage entry for ventilation of the working faces has the potential to increase the quantity of air available for dilution of methane and respirable dust in the face area, provide dilution air for methane and respirable dust in the area near section loading points, assure positive ventilation of the belt entry itself, and permit the direction of leakage to be more easily controlled.

The incidence of belt entry and trolley haulage entry fires resulted in the passage of section 303(y) of the Coal Act, later adopted as section 303(y) of the Mine Act. This language was promulgated as a mandatory standard through section 75.326 of 30 CFR as follows:

§75.326 Aircourses and belt haulage entries.
[Statutory Provisions]

In any coal mine opened after March 30, 1970, the entries used as intake and return air courses shall be separated from belt haulage entries, and each operator of such mine shall limit the velocity of the air coursed through belt haulage entries to the amount necessary to provide an adequate supply of oxygen in such entries, and to insure that the air therein shall contain less than 1.0 volume per centum of methane, and such air shall not be used to ventilate active working places. Whenever an authorized representative of the Secretary finds, in the case of any coal mine opened on or prior to March 30, 1970, which has been developed with more than two entries, that the conditions in the entries, other than belt haulage entries, are such as to permit adequately the coursing of intake or return air through such entries, (a) the belt haulage entries shall not be used to ventilate, unless such entries are necessary to ventilate, active working places, and (b) when the belt haulage entries are not necessary to ventilate the active working places, the operator of

such mine shall limit the velocity of the air coursed through the belt haulage entries to the amount necessary to provide an adequate supply of oxygen in such entries, and to insure that the air therein shall contain less than 1.0 volume per centum of methane.

The objective of this provision, according to the Senate, was to:

. . . reduce high air velocities in the belt haulageways where coal is transported, because such velocities fan and propagate mine fires, many of which originate along the haulageways. Rapid intake air currents also carry products of the fire to the working places quickly before the men know of the fire and lessen their time for escape. If they use the aircourses to escape, the air coursed through may contain these products and quickly overtake them. Also, the objective is to reduce the amount of float coal dust along belt haulageways. (House of Representatives floor debate on the Coal Act, reprinted in the Legislative History of the Federal Coal Mine Health and Safety Act of 1969 [hereafter 1969 Legislative History], Committee Print, Part 1, p. 1346 (August 1975)).

Separation of escapeways from belt haulageways is addressed in the Senate Report on the Mine Act as follows:

Section 216(d)

This section requires that all new mines separate the escapeway which is on intake air from the belt or trolley haulageway because mine fires often originate in these haulageways and within a relatively short time the air current is completely filled with smoke, and harmful matter. (Senate Report, p. 83, reprinted in the 1969 Legislative History, Part 1, p. 209).

The legislative history of the Coal Act explained the separation of intake and returns from belt and trolley entries as follows:

Section 204(y)

This section requires that, in the case of new mines, intake and return entries must be separated from belt and trolley entries, and the operator must limit the velocity of air coursed in such haulage entries to that needed to supply adequate oxygen to protect the health of miners, and to control methane. The separation would be through the use of permanent stoppings constructed of incombustible material. . . . In some mines it is not possible to isolate the intake and return airways from the haulageways. The latter is particularly true in a two or three entry system where the haulageway, of necessity, must be used to

ventilate the face. Even in a multiple entry system of more than three entries, in some cases the haulageway runs for miles and some parallel entries may be blocked or partially blocked from roof falls, particularly in low coal, and, in some cases, it is not practical to open such entries. (Senate Report, p. 64, reprinted in the 1969 Legislative History, Part 1, p. 190).

Although not explicit in the Legislative History, it has been the understanding of those closely involved with the mining regulations that Congress expected that with the enactment of section 303(y), contaminants from any fire in the belt entry would be contained in that entry if the entry were physically separated from the other entries by permanent stoppings, and that the belt air would be coursed directly through the return and miners would not be exposed to any of the fire contaminants. The BEVR Committee determined, and this Committee heard testimony, that the objective of Congress to provide isolated aircourses is not achievable with reliable results in underground coal mines, and that air leakage occurs between mine entries even though they are separated by substantially constructed permanent stoppings. The BEVR Committee noted that the importance of protecting the intake escapeway from air leakage from the belt entry or any other entry having fire sources was illustrated by the fire at the Marianna Mine in 1988, during which miners were required to escape through smoke.

When the Coal Act was written, the sentiment prevailed in the mining community that the air velocity in the belt haulage entry should be at the lowest level consistent with providing oxygen at or above 19.5 volume percent and with keeping the methane content to less than 1.0 volume percent. This was based upon the belief that lower velocities would lessen fire propagation. However, limiting the velocity of the air to very low levels can lead to other hazards. Research has shown that the ability of air to dilute methane and prevent layering in a mine entry increases with the air velocity, and that while an entry air velocity of even 100 feet per minute (fpm) may help prevent the layering of methane, it may not keep layers from occurring in some areas of some mines depending upon the slope of the entries and the condition of the roof line.

Throughout the House and Senate debates on the Coal Act and the Mine Act, Congress emphasized that the Secretary needs to have flexibility with respect to developing and modifying mandatory standards in order to be able to respond to advances in mining technology and changing mining conditions. Senator Williams commented on this issue during the Senate debate on the Mine Act as follows:

An important aspect of the bill is the matter of standards, the guidelines with which mine operators

will have to comply. S. 717 recognizes that mining is not a static industry and that constantly developing new techniques require constant evaluation of the continued vitality of standards. Standards which are outmoded expose miners to unnecessary risks. They also compel operators to continue to comply with requirements which may no longer adequately serve the purpose of protecting miners. (Senate floor debate on the Mine Act, reprinted in the Legislative History of the Federal Mine Safety and Health Act of 1977, Committee Print, p. 905 (July 1978)).

Around 1972, the first of many petitions to modify the application of section 75.326 was filed. Eventually, permission was granted to permit the use of the air in the conveyor belt haulage entry at the face provided a prototype carbon monoxide monitoring system (a technology not available in 1969) was installed to detect belt-entry fires. There have been 82 petitions for modification of section 75.326 granted by MSHA from 1977 through the first quarter of 1992. At this time, approximately 55 of these petitions for modification are active. A number of mines for which petitions were granted, including the mine that obtained the first petition, have since closed. Since the first petition of section 75.326 was filed, there have been 59 reportable (greater than 30 minutes) fires involving the belt conveyor entry. Of this number, 13 fires were in mines permitted to use belt air for face ventilation either under the terms of a petition for modification or with MSHA approval because the mine was developed prior to 1970. It should be noted that the type of belt-entry ventilation was not a factor in the start of any of these fires. Six of the 13 fires were in mines that used CO monitoring systems for fire detection in the belt entry. Of these six, three were detected by the monitoring system, one was detected by the monitoring system and visual observation simultaneously, and two were detected by visual observation. In addition to reportable fires, the Committee received information on five additional fires or heatings that lasted less than 30 minutes. Four of these were detected by the monitoring system and one was detected by visual observation.

By 1989, at the time of the issuance of the BEVR Report, there were approximately 60 mines using belt air under petitions for modification granted by the Agency for section 75.326. In 1989, three significant changes to the criteria for granting these petitions for modification were made based upon improvements in technology as demonstrated by information provided to MSHA by BOM. Originally, the spacing of the CO sensors was every 2,000 feet. In 1989, the Assistant Secretary reduced that spacing from 2,000 feet to 1,000 feet in a decision in a case on appeal concerning modification of section 75.326. An entry air velocity cap of 300 fpm previously required by MSHA was removed in 1989 by the Assistant Secretary in a case on appeal from a decision of an

Administrative Law Judge. The third change was to require, in mines using belt air under a petition for modification of section 75.326, that conveyor belts with improved flame resistance characteristics be installed underground when such belting became commercially available.

MSHA's Industrial Safety Division (ISD) at the Pittsburgh Safety and Health Technology Center identified for the BEVR Committee 42 underground mine fires as belt fires out of a total of 280 underground mine fires reported between 1970 and 1988. A subsequent review by the ISD incorporated into the analysis 22 additional fires that spread to the belt entry. The ISD concluded that close examination of the data reaffirmed the fact that fire hazards are associated with conveyor belt entries, but similar experiences in terms of injuries, ignition sources, fire detection, escape and maintenance deficiencies as a contributory factor, can occur regardless of whether or not belt air is used to ventilate a working face. Today, the primary hazard associated with the belt entry is the conveyor belting which can be ignited and propagate flame along its length.

Point-type heat sensors have been required by MSHA to detect fires since 1969. The BEVR Committee indicated that the point-type heat sensors did not reliably detect fires in the early stages of development.

The BEVR Report also addressed the issues of both float coal dust and respirable dust. Any readily observable accumulation of float coal dust on the mine roof, floor, ribs or on the belts can contribute to the propagation of a coal mine explosion. The float coal dust is created by the degradation of the coal. This occurs by crushing the coal or by mechanically breaking it in some way. The BEVR Report also addressed the concern that significant levels of respirable dust generated within the belt entry from crushers, transfer points, dump points or coal moving in the opposite direction of the air current would, if not controlled, contribute to the workers' exposure at the face if the air is taken to the face.

IV. REPORT OF COMMITTEE ACTIVITIES

Meetings of the BAAC were held in Arlington, Virginia; Birmingham, Alabama; Pittsburgh, Pennsylvania; Lexington, Kentucky; and Denver, Colorado. The BAAC also traveled to Jim Walter Resources No. 3 Mine.

First Meeting

The first meeting of the BAAC was held on March 30 and 31, 1992, in Arlington, Virginia. Mr. William J. Tattersall, Assistant Secretary of Labor for Mine Safety and Health; Mr. Marvin Nichols, Administrator for Coal Mine Safety and Health at MSHA; and Ms. Patricia Silvey, Director of the Office of Standards, Regulations and Variances welcomed the Committee and briefly described the Committee's background and purpose. Advisory Committee Chair Dr. Mary Jo Jacobs welcomed the members of the Committee. Dr. Jacobs then presented the Committee with her views on the operation of the Committee. In addition to the Committee and staff, 20 members of the public were in attendance.

Mr. Robert W. Dalzell, Assistant Director for Health for MSHA's Directorate of Technical Support and a member of the BEVR committee, presented a review of the BEVR Report.

The Advisory Committee developed a list of issues through an informal process of identifying all relevant problems and concerns within the context of the Committee's Charter. This list of issues served as a working agenda for subsequent meetings. Issues identified include ventilation system design, fire safety, education, training and management, health, and monitoring systems. The complete list of the issues is included as Appendix F of this Report.

At the conclusion of the meeting, MSHA distributed background and technical material to each member of the Committee. This material included a copy of the BEVR Report, copies of transcripts of relevant testimony given by representatives of the United Mine Workers of America (UMWA) during the public hearings on proposed Ventilation Standards for Underground Coal Mines and relevant written comments of the UMWA on the proposed ventilation standards for underground coal mines. It also included the complete transcript of the public hearing on the BEVR Report held in Reston, Virginia and a copy of a letter from Mr. Richard Trumka, International President, UMWA to Secretary of Labor Lynn Martin regarding his organization's withdrawal from participation on the Advisory Committee.

Second Meeting

The second meeting of the BAAC was held in Birmingham, Alabama, on April 22 and 23, 1992. Prior to the beginning of the second meeting, the Committee and several members of the staff visited the Jim Walter Resources No. 3 Mine. This mine is currently using the air in the belt conveyor entry for ventilating working places under the provisions of a petition for modification granted by MSHA. The agenda for the second meeting addressed two of the issue areas identified by the Committee during the first meeting: ventilation system design and the use of monitoring systems. A number of presentations were made relative to these subjects. In addition to the BAAC and staff, 29 members of the public were in attendance.

Relative to the mine design issue, the Committee heard presentations by two members of the staff, Mr. Jerry Fuller, MSHA Mining Engineer and Dr. Fred Kissell, Research Supervisor, BOM. During his presentation, Mr. Fuller discussed typical mine designs for three, four, and five-entry ventilation systems. Several technical questions were raised during the presentation and several members of the Committee emphasized the need for flexibility in design.

During his presentation, Dr. Kissell addressed the maintenance of escapeway integrity by reviewing BOM research of the last several years. He distributed handouts to the members of the Committee and gave a synopsis of each. They dealt with the following topics: 1) The proportion of smoke and fumes that leak from intakes; and 2) The use of parachute stoppings to reduce or reverse the flow of contaminated air by increasing pressure in the entry of escape.

Following these presentations, the Chair initiated a discussion of the following: advantages and disadvantages associated with maintaining two escapeways on separate splits of intake air; use of belt entries as alternate escapeways; and advantages and disadvantages of maintaining a minimum air velocity in all belt entries.

One member of the Committee discussed the difficulties of maintaining a single isolated escapeway and suggested that several problems might result if an alternate intake escapeway was required. The member further suggested that the proper approach is to make the intake (primary) escapeway less prone to fire. A discussion followed on the best methods of protecting the primary escapeway.

The second day of the meeting was devoted to the use of AMS. A panel of equipment manufacturers was convened to discuss the specifics of their products as well as monitoring in general.

Members of the panel included the following:

Mr. Greg Bowman, Conspec Controls
Mr. Len Blatnica, MSA
Mr. Harry Dushac, National Mine Service Company, FEMCO
Mr. Jim Gunnoe, American Mine Research
Mr. Al Ketler, Rel-Tek Corporation
Mr. Larry Hambrick, Line Power Manufacturing
Mr. Al Billings, Pyott-Boone Electronics

The panel discussed a wide range of issues with the Committee. These issues included system operation, maintenance and reliability; the need for performance standards; nuisance and false alarms; and training requirements. The panel members were requested to submit written responses to a list of concerns of the UMWA regarding AMS. Their responses were distributed to the Advisory Committee members.

Following the panel discussion, the Committee heard a presentation on the current practices in the use of AMS in the mining industry by Mr. William J. Francart, Supervisory Mining Engineer with MSHA's Pittsburgh Safety and Health Technology Center. A question and answer session followed Mr. Francart's presentation.

Third Meeting

The third meeting of the BAAC was held in Pittsburgh, Pennsylvania, on May 21 and 22, 1992. The agenda for the meeting focused on the issue of fire safety. The meeting included a presentation on fire safety by Mr. Donald Mitchell, private consultant and an expert in the area of mine fires. There was also a presentation by Mr. Steve Luzik of MSHA on mine fire experience since 1978; a presentation on smoke sensors by Mr. Charles Litton of the BOM; and a presentation on BOM Report of Investigation 9380 (RI 9380), Fire Detection for Conveyor Belt Entries, by Dr. Charles Lazzara and Mr. Charles Litton of the BOM. A panel comprised of conveyor belt manufacturers presented a discussion on belt flammability. The Committee viewed two video tapes related to escape from a mine fire and smoke obscuration. In addition to Committee members and staff, 33 members of the public were in attendance.

Mr. Mitchell told the Committee of his concerns with the conclusions and recommendations of the current BOM research in the area of fire detection, in particular, that research presented in RI 9380. His concerns centered around data interpretation, air velocity determinations (i.e. according to Mr. Mitchell, the air velocity under a moving conveyor could be much less than the average air velocity in the cross section), the method of handling parallel entries, and the lack of similarity between test conditions and actual in-mine conditions.

Mr. Mitchell made several recommendations to the Committee during his presentation and subsequent questioning. He recommended that a deluge system be used and that it incorporate a water flow switch that is included in the mine-wide monitoring system. Further he requested that the Committee consider recommending that belt drive deluge systems be activated by the CO sensor just inby the drive.

Mr. Mitchell also suggested to the Committee that the minimum velocity required in a belt entry should be that needed to militate against methane layering instead of the 50 fpm minimum now used. Finally, concerning the need to establish a maximum air velocity, Mr. Mitchell suggested that the relative velocity (the sum of the air velocity in the belt entry and the belt speed) not exceed 2000 fpm. Mr. Mitchell went on to suggest that the preferred relative velocity is between 1,200 and 1,500 fpm. Other subjects addressed by Mr. Mitchell included low-CO smoke, water lines, stopping construction, lifelines, escapeway integrity, point feeding of belt entries, the use of additional fire suppression along belt conveyors, belts in the return, protecting the belt entry as well as detection, alarm thresholds, sensor spacing and the training of miners in escape.

Mr. Luzik, in his presentation and subsequent discussion with the Committee, presented data relative to the locations within mines where fires have occurred and ignition sources of mine fires. Mr. Luzik indicated that approximately one third of the mine fires during the period 1978 to 1992 were in the belt entry and the predominant ignition source was friction. Mr. Luzik indicated that there has been a significant reduction in the number of reported fires in the last two and one-half years. It was noted that the percentage of reported fires in the conveyor belt entry actually increased in 1992 when compared to past years. It was also noted that cutting and welding accounted for nearly 25 percent of the belt-entry fires and that this is an activity that is not confined to the belt entry. Following his presentation, the Committee requested Mr. Luzik to provide the following additional information:

- 1) A breakdown of reported belt-entry fires that only involve burning of the belt or its associated components;
- 2) The percentage of belt-entry fires that started on the belt;
- 3) A breakdown of the fires occurring on mains and sections;
- 4) The percentage of reportable fires versus those that were not officially reported but for which a memorandum was issued; and
- 5) A breakdown of reportable occurring on moving belts and stopped belts.

This information was supplied by Mr. Luzik and reviewed by the Committee. Mr. Luzik was also requested to provide information regarding the number of fires that occurred in an escapeway. Mr. Luzik was unable to furnish this information to the Committee due to the nature of the reports.

Dr. Lazzara and Mr. Litton presented to the Committee the results of recent BOM research. Mr. Litton first reported the results of a 47 week, in-mine investigation of smoke sensors. Although these detectors were affected by diesel exhaust, and in some instances rock dust, there were also some reported instances of the sensors detecting overheated rollers and belts rubbing against belt structures. Dr. Lazzara and Mr. Litton jointly presented their research on fire detection in conveyor belt entries as set forth in RI 9380. Following a description of the tests by Dr. Lazzara, Mr. Litton described the analytical method used to evaluate the data and the use of nomographs presented in RI 9380 for determining system alarm levels. Considerable discussion by the Committee followed the presentation. Questions dealt with both the test and the interpretation of the data. As a result of questions from the Advisory Committee regarding data interpretation in RI 9380, an independent analysis of the data was requested by the Chair and obtained from Dr. William L. Grosshandler, Head, Exploratory Fire Technologies, U. S. Department of Commerce, National Institute of Standards and Technology. Dr. Grosshandler's review is attached as Appendix G.

The panel of conveyor belt manufacturers discussed their individual products and the flammability of conveyor belting in general. This panel consisted of the following individuals:

- Mr. Michael Hinchliffe, Fenaplast Div., Fenner America, Inc.
- Mr. Ronald Wright, Georgia Duck
- Mr. Indi Chopra, Scandura, Inc.
- Mr. Bob Rodruan, Goodyear Tire and Rubber Company.

During the panel presentations and the questions that followed, panel members indicated that there was a need for an improved belt test and indicated that their companies had belts that would pass the test that has been developed by the BOM. Speaking on behalf of the industry with regard to belt-fire safety, Mr. Dave Lauriski, Co-chair of the American Mining Congress' and the National Coal Association's Industry Taskforce on Ventilation, stated during the public comment period "this industry sometime ago has pushed MSHA for improved fire-resistance standards on the belts, or improved safety standards for belts." Mr. Lauriski went on to state "we would encourage this Committee to make the recommendation that these should be put on the fast track, as we honestly believe that that's something that can help benefit the fire safety issue."

Fourth Meeting

The fourth meeting of the BAAC was held on June 1 and 2, 1992, in Lexington, Kentucky. Minutes from the third meeting were accepted with minor changes. The Chair stated that the meeting was to be devoted primarily to a discussion of health issues and education and training. In addition to the Committee members and staff, 28 members of the public were in attendance.

Mr. Robert A. Jankowski, a Supervisory Physical Scientist with the Dust Control and Ventilation Group of the Pittsburgh Research Center of the BOM, discussed a study entitled: "Dust Considerations When Using Belt Entry Air To Ventilate." The impact of using belt air on dust levels at underground mining operations was investigated in the study. A mine was located which had been in operation prior to the Coal Act and had been utilizing the belt entry as an intake entry. The study determined that with or without belt air, there was no significant difference in the dust exposure levels at any of the observed locations. Two significant relationships were discovered: 1) for every thousand-foot increase in belt length, a 0.1 milligram per cubic meter (mg/m^3) increase in dust levels was experienced, 2) for every 200 to 500 tons per shift increase in production, there was a 0.1 mg/m^3 increase in belt entry dust levels. According to Mr. Jankowski, moisture had some effect on the dust levels but the effect was very site specific.

Mr. Robert A. Haney, a Supervisory Mining Engineer with the Dust Division of the Pittsburgh Safety and Health Technology Center, MSHA, made a presentation on "Belt Air Dust Issues." He addressed velocity versus entrainment and the effect of using belt air on the dust exposure of the employees at the face. He concluded that velocity affects entrainment only if the increase in velocity is caused by restriction; if the increased velocity results from an increased air quantity, dilution compensates for entrainment. Relative to the effect of belt air on dust exposures of face workers, Mr. Haney stated, "The use of belt air can increase or decrease face exposures; however, the change will generally not be significant."

Dr. Jon Yingling, Assistant Professor of Mining Engineering at the Department of Mining Engineering, University of Kentucky, presented a "Review of the Statistical Analysis of Dust Data from the BEVR Report and Subsequent Information." He concluded that he agreed with Dr. James L. Weeks' (UMWA) criticism of the statistical handling of these data and went on to say that these statistics were not germane to the question of whether or not to use belt air to ventilate the face.

Dr. James Bennett, private consultant in the area of training, presented a discussion of the cultural and organizational factors related to modifying work performance. According to Dr. Bennett,

the four primary factors common to companies successful in this area are: a plan, with involvement at all levels of the company; a sense of ownership, e.g., in terms of decision making in establishing the maintenance process; integration of new activities as part of everyone's job; and multi-level stewardship and accountability of the training.

An open discussion was conducted by the Committee concerning maximum and minimum velocities. It began with the Advisory Committee's earlier conclusion that, "The minimum velocity shall be set based on the ability of air to prevent methane layering . . . [and] If an AMS system is present, to ensure there is no significant delay in the transmission of the products of combustion to the nearest sensor or based on maximum allowable spacing." The velocities required to control methane layering were discussed but no specific minimum velocity was adopted. Maximum velocities were discussed but no conclusion was reached. During the deliberations on this subject, the Committee concluded that the primary concern is achieving the objectives of health and safety rather than specifying a single number for a maximum velocity.

Comments were made by Mr. Joseph Main, Administrator, Department of Occupational Health and Safety, UMW. In his presentation, Mr. Main gave the Committee his views on the historical application of the Mine Act and on other substantive issues that concerned him. Issues that he addressed included the following: the relationship between the number of belt air mines and non-belt air mines; velocity caps; reliability of AMS and the ability of these systems to detect fires in high velocities due to the dilution effect; and communications. He also addressed the reduction in the number of entries; length of longwall gate roads; "smokefree" escapeways; and the need to ventilate all escapeways with intake air. The other topics he covered included the need for improved testing requirements for conveyor belts and for approval schedules for monitoring systems, conveyor belt and conveyor belt entry maintenance, and the training and certification of persons responsible for maintaining and operating the AMS. Mr. Main stated that although his organization chose not to participate on the Committee, the position of the miners represented by the UMW on the issues under consideration could be obtained by reviewing the transcripts of the public meetings on the ventilation rule and the BEVR Report.

At the request of the Chair, Mr. John Gallick, Safety Director, BethEnergy Mines, addressed the Committee on the subjects of training, fire prevention, fire fighting and escape. Mr. Gallick has experience in these areas and is intimately knowledgeable on the subject of the 1988 Marianna Mine fire. In addition to addressing some of the questions raised relative to the Marianna Mine fire, Mr. Gallick informed the Committee of many of the

actions taken by his company as a result of the fire. These actions included the following: limiting the number of remote belt restarts; reduction of the alert and alarm levels for AMS; installation of section alarms for AMS; installation of lifelines in escapeways; installation of CO sensors in track entries when belt and track entries are common; and the installation of devices such as parachute stoppings to pressurize escapeways during emergencies. Mr. Gallick showed a video tape on the use of a water barrier (wall of water) to slow the progress of a fire and discussed the same with the Committee. During his discussion on training, Mr. Gallick told the Committee that underground personnel need to be trained to expect smoke during evacuation and they need to be trained in the use of lifelines and pressure control devices (e.g. parachute stoppings). The Advisory Committee discussed lifelines and the advantages that are associated with their use.

Mr. John Dower and Mr. Heinz Ahlers of NIOSH presented a discussion on "Impact of Using Belt Air on Health." Mr. Dower indicated that the dilution effect of belt air will be dependent upon the design of the section ventilation system. Dilution will occur only if the belt air contributes additional air quantities containing low levels of respirable dust when mixed with other section intake aircourses. Using belt air to ventilate working places exposes miners to all belt fire products. Several tables were displayed listing the combustion by-products which could result from conveyor belt fires involving various mine materials. Some of the by-products were listed as highly toxic. Exposure to fire-smoke contaminants by breathing and/or skin absorption could result in health effects ranging from skin dermatitis to cancers. During later meetings, however, it was noted that studies have not been conducted on miners who have been required to escape through smoke to determine what health effects they may have suffered. The health effects could be expected to vary depending on factors such as the length of time of exposure, the type of material involved, and the temperature of the burning. Earliest detection of fires accompanied by immediate evacuation should be provided to protect the health and safety of escaping miners. NIOSH supports the use of CO sensors plus auxiliary smoke detectors at designated locations in belt entries. The relative risk of contamination of escapeways from belt entries used as neutral splits or as intakes was stated by Mr. Dower as follows: "There is some risk of contamination of the escapeways with smoke and toxic fire products, but it's problematical if this risk is greater than that associated with maintaining the belt entry on a neutral air split."

Fifth Meeting

The fifth meeting of the BAAC was held in Denver, Colorado, on August 3, 4 and 5, 1992. This meeting was held as a working

session and therefore no presentations were made except during that portion of each day set aside for public comment. In addition to the Committee members and staff, 23 members of the public were in attendance.

The Committee discussed the working paper prepared by its Subcommittee on Fire Safety. The working paper was modified and adopted for inclusion in the body of this Report as additional guidance for the Agency.

The Committee then discussed the working paper prepared by the Training Subcommittee. Based on these discussions, alternative amendments to Recommendation No. 3 were prepared. The two options dealt with the term used to describe the individual who is to be present to monitor the AMS when persons are underground. Option 1 described this individual as "qualified." Option 2 described this individual as "trained." Following much discussion, including input from members of the public, the second option was adopted by the Committee.

There was extensive discussion of housekeeping and belt spillage both as a management responsibility and as a frequent cause of citation by MSHA. During the discussion, a suggestion was made that a review of the practices being followed by mines that have a good record in this area may be beneficial. The Chair pointed out that within any industry ". . . you can look at persons who are doing the job well and learn from them some keys to how they accomplish that and whether that's good management, or good maintenance, or good anything." The discussion of this issue was not completed and was resumed at the following meeting.

During the public comment period, Mr. Dave Lauriski from Energy West provided the Committee with two stacks of material to illustrate the relationship of mine fires to ground failures in underground coal mines. A stack several inches in height contained MSHA reports of mine fire investigations while a stack several feet high contained reports of ground failures. Mr. Lauriski stated that there were 1271 instances of fatalities from fall of ground and 44 instances from mine fires. Mr. Joseph Agapito of Agapito and Associates discussed examples of ground stresses and illustrated a number of situations where ground fall occurred in multiple entry mining and did not occur in two entry mining. He concluded that safe mine design in adverse conditions may warrant decreasing the number of entries.

Sixth Meeting

The sixth meeting of the BAAC was held in Arlington, Virginia, on September 9, 10 and 11, 1992. This meeting was held as a working session. The Committee focused on the resolution of remaining issues and the development of the Final Report. Presentations were kept to a minimum and reserved to the extent possible to

that portion of each day set aside for public comment. In addition to the Committee members and staff, 23 members of the public were in attendance.

The Committee meeting began with a discussion of dust levels in intake air in belt entries and the possibility of designating areas within the belt haulageway for dust sampling. After discussion of information presented and additional related issues, the Committee adopted language recommending designated areas for sampling in belt conveyor haulageways and a 1.0 mg/m^3 respirable dust limit at a point just outby the section tailpiece in belt conveyor haulageways used to ventilate the working place.

As a clarification for the Agency, the Committee expressed its intention that the entire Final Report be fully considered by the Agency and that the Committee did not expect the formal recommendations contained in the Report to be given any greater weight than guidance contained elsewhere in the Report.

The Committee next began consideration of the Escapeway Subcommittee report. The discussion included four principal issues: 1) whether the primary and the alternate escapeways should both be in the intake; 2) if both are in intakes, whether they must be physically separated and on separate and distinct splits of air; 3) how the escapeways are to be evaluated; and 4) what needs to be submitted to the Agency in terms of supporting data. A discussion of the report ensued. At the close of the morning session, the public was provided an opportunity to address the Committee.

Dr. Kissell, BOM, commented on several portions of the Final Report working document. He stated that two communication lines in the same entry do not constitute redundancy because they would be subject to "common-cause failures." He also questioned whether it was desirable or possible to provide positive pressure differential from the primary escapeway to adjacent entries. A member of the Committee pointed out to the speaker that positive pressurization was a goal and that unless there is a fire in the primary intake escapeway, that would be the escapeway that miners should use to escape the fire. Another member of the Committee pointed out that the Committee considered the likelihood of a fire in the intake escapeway and supported MSHA's new regulation to the effect that primary intake escapeways be maintained free of potential fire sources.

The Committee considered the issue of recommending that increased emphasis be placed on belt cleanup and maintenance. A member of the Committee stated:

I don't think that we can overemphasize the problem. . . . Belt lines can be maintained better with more manpower and I believe that

is the biggest key to it. Just simply, most of these places that are receiving high citations just aren't putting the manpower to work on them.

It was noted that belt entry clean-up was one of the two major issues pointed out by miners at the Reston hearing as problem areas (the other being AMS reliability). Another member of the Committee objected because he felt the suggested wording, "increased emphasis," was too vague.

The Chair referenced a letter received from Mr. Arthur Anderson of J. H. Fenner and Co., Ltd. discussing world-wide standards for conveyor belting. The Chair requested that the Committee review the letter and raise any points that need to be further addressed by the Committee.

The Chair requested that members provide, by noon of the next day, a list of any unfinished business items or questions that the Committee needed to address so that there would be adequate time for discussion.

The Chair opened the meeting to public comment. Mr. Kevin Burns of the American Mining Congress questioned whether the Committee's determination to recommend increased emphasis on cleanup and maintenance at belt air mines accomplishes what was intended. He questioned whether cleanup was any more of a problem at belt air mines than at non-belt air mines. The Committee agreed to consider his comments.

The Committee began discussion and revision of the Final Report working document prepared by the staff in cooperation with the Chair and previously sent to the Committee members for review.

The second day of the meeting began with a resumption of the discussion of the report of the Escapeway Subcommittee. The Committee considered and approved language recommending, inter alia, that: Without precluding the use of a return entry or the considerations of other factors, such as ease and quickness of escape, clearance, and ground control in the choice of escapeway ventilation, the alternate escapeway should preferably be ventilated with intake air.

The Committee devoted the balance of the morning session to discussion and revision of the Final Report working document. At the public comment period at the end of the morning session, Mr. Wayne Hoffman, Marketing Manager with Scandura, Inc. addressed the Committee. He stated that new, stricter conveyor belting standards discussed by the Committee will require conveyor belts that Scandura, as well as their competitors, are quite capable of producing today. Mr. Kevin Burns questioned the Committee language which would recommend that belts in inventory

as of the date of publication of the final rule be permitted to be used. He felt that the effective date of the rule would be more appropriate. The Committee reconsidered the issue and determined that a reference to inventories of belting material should appear in the discussion and not in the recommendations section of the Report. It should reflect the intention of the Committee not to permit inventories to be used for an extended period of time. The Committee did not recommend a specific cut-off date or time frame.

The afternoon session of the second day began with a presentation by the UMWA. Mr. Robert Scaramozzino, Deputy Administrator of Safety for the Department of Occupational Health and Safety with the UMWA, produced a box of material for submittal for the record. Mr. Scaramozzino requested that all of the information provided, along with reports and exhibits, be reviewed by the Committee before concluding and issuing a final report. He stated that in the Lexington meeting of the Advisory Committee, Mr. Joseph Main of the UMWA was asked to provide updated information regarding problems that exist with atmospheric monitoring systems and as a result, the UMWA surveyed 25 coal mines in the United States. The material presented at this session of the Advisory Committee included a sample questionnaire and an analytical study of the findings of the survey. He stated that in a large percentage of the mines surveyed reliability was questioned because of false and nuisance alarms, some of which resulted from welding and cutting. He stated that 50 percent of the mines surveyed had fires that went undetected. He added that in each case the AMS was required through either a petition for modification or an approved MSHA plan and should have been maintained and operating properly at all times. Mr. Scaramozzino stated that many of the problems were similar to those reported earlier by the UMWA, that is, poor maintenance and the inability of the sensors to differentiate between gases.

Mr. Scaramozzino stated that the UMWA feels that there is a strong need for performance standards for AMS. He added that there are sensors that are adversely affected by moisture, rock dust and coal dust. He identified float coal dust accumulations as a problem as well as high velocities, and associated both with recent coal dust explosions and fires.

The next speaker for the UMWA was Ms. Linda Raisovich-Parsons, Legal and Legislative Assistant to the UMWA Department of Occupational Health and Safety. Ms. Raisovich-Parsons requested that the Committee review the litigation related to the petition for modification of Cyprus Emerald Resources to use belt air to ventilate the face. The U. S. Court of Appeals remanded the case to the Assistant Secretary to address three issues: (1) whether the CO monitors issue false alarms with such frequency that miners will not heed and respond to the alarms; (2) whether the use of belt air will unacceptably increase the risk of hazardous

non-CO smoke reaching miners at the face; and (3) whether the unlimited air velocities will lessen the effectiveness of the CO monitors and cause greater flame propagation or lessen escape time in the event of a fire. Ms. Raisovich-Parsons stated that the Committee should also consider the proper use of handheld monitors as reflected in this case as well as the testimony of Charles Litton, Tom Rabbitt and Charles Lazzara, who testified in the case relative to the three issues. The brief of the UMWA was included and identified as a statement of the position of the UMWA on these issues. She stated that the UMWA submission included every comment and all testimony presented, and all the post-hearing comments by the UMWA, from the ventilation regulation rulemaking and the BEVR Report.

Mr. Tom Rabbitt, UMWA International Health and Safety Representative, next addressed the Committee. He stated that the information submitted included two packets from the Department of Occupational Health and Safety. One dealt with the effects of belt-air velocity on fire growth rates, intake escapeways, float coal dust and fire detection systems and the second dealt only with escapeways. Each of these packets contained several documents. According to Mr. Rabbitt, these packets, along with other submissions, detail the position of the UMWA. Mr. Rabbitt indicated UMWA support for the use of RI 9380 in connection with the concept of a velocity cap. He stated that Mr. Mitchell, during testimony in the Cyprus Emerald Resources petition for modification hearing, advocated a 1,200 fpm relative velocity cap. Mr. Rabbitt endorsed the need for a velocity cap. He stated that the UMWA has been asking for two intake escapeways since the Wilberg disaster in 1984. He stated that the Committee needs to take a firm position that the highest quantity and the highest pressure should be in the intake escapeway if belt air is used to ventilate the face. Lifelines should be directional and belts should be separated from the track entry.

Mr. Tom Wilson, UMWA Representative, addressed the UMWA transcript review of the Advisory Committee meetings. He stated that the Committee had a bias toward a predetermined conclusion. He stated that the Committee ignored and did not address questions raised concerning undetected heatings and toxicities along the belt entry, the testimony of miners before MSHA in 1988, the legislative history of the Mine Act, section 303(b) dealing with respirable dust, and float coal dust.

A member of the Committee asked Mr. Scaramozzino to identify the areas to be addressed by performance standards for AMS. Mr. Scaramozzino listed the following: lock-ups of the system; outside electrical interference; power lines causing fluctuations in the system; and maintenance. Mr. Scaramozzino referenced the submitted minutes of a meeting with Mr. Kenneth Sproul of MSHA's Approval and Certification Center for further information. A member of the Committee asked if there were any studies submitted

relative to the problem of coal dust. Mr. Scaramozzino indicated that none was submitted by the UMWA, although he suggested the BOM as a source of possible information and mentioned Mr. Mitchell's statement as to a cap on velocity. A member of the Committee initiated a discussion with the UMWA where both agreed there was joint labor and management responsibility for belt maintenance. The UMWA pointed out that understaffing is a problem that has resulted in no one maintaining the belts. There was clarification that the coal dust ignitions that took place were not, in fact, along the belt haulage entries but were in the face areas.

The UMWA submitted a copy of the proposed decisions and order for a petition for modification submitted for the Powhatan No. 6 Mine. Mr. Rabbitt stated that the UMWA has been appealing all of the proposed decisions and orders of MSHA relative to petitions for modification for mines using belt air. However, it did not appeal the recent Powhatan No. 6 Mine proposed decision and order which it negotiated with the Company prior to submission to MSHA.

The Committee determined that it would address the information provided by the UMWA. The Escapeway Subcommittee was provided with all the information submitted for consideration relative to escapeways. The Fire Safety Subcommittee was provided with all information related to fire incidents or fire. The Chair retained for review all material dealing with housekeeping issues and the Cyprus Emerald Resources transcripts. Each Committee member received a copy of the survey of 25 mines and portions of the Cyprus Emerald Resources case. Other material submitted was previously reviewed by the Committee. The Chair indicated that there was a degree of factual error in the presentation of the UMWA relative to their characterization of the Committee's deliberations and conclusions due to their absence from the meetings or misinterpretation of some of the Committee conclusions.

The Committee formally approved recommendations it had previously considered regarding lifelines and respirable dust control. It also discussed the contents of the section of the Final Report dealing with research, and the Escapeway Subcommittee report.

The Subcommittees were requested to review the submissions of the UMWA as distributed and identify issues that were addressed by the Committee and any that needed further consideration. The Committee completed its review of the Final Report working document.

The Chair began the third day of the final meeting by stating that the original copies of the survey questionnaire would be requested from the UMWA. The full Committee broke up into working groups to complete the analysis of the UMWA submissions. When the meeting reconvened, each working group reported back to

the Committee. The Committee concluded that all issues had been addressed and that additional recommendations were not warranted.

During the public comment period, Mr. Lauriski, Director for Health and Safety for Energy West Mining Company, cited the Committee record to the effect that it cannot be said that the majority of fires occur in the primary intake escapeway. He also addressed the causes of the Wilberg Mine fire and stated that two intake escapeways on separate splits of air would not have made a difference in the Wilberg fire. Mr. Wilson of the UMWA presented the Committee with reports of 16 coal dust and/or methane ignitions, copies of the AMS performance survey conducted by the UMWA, and copies of the legislative history of Section 303(y) and 317(f) of the Coal Act. Mr. Dower of NIOSH addressed the Committee relative to clarifying the issue of the production of hydrogen chloride gas and CO by various belting materials.

The Committee developed language for inclusion as a discussion of the recommendation dealing with maintenance. The Committee was invited to make remaining comments with respect to language contained in the Report. The Committee approved the recommendation dealing with escapeways.

V. SUMMARY OF COMMITTEE RECOMMENDATIONS

The Belt Air Advisory Committee was charged with addressing three separate issues: Issue 1 - the conditions under which belt haulage entries could be safely used as intake aircourses to ventilate working places; Issue 2 - minimum air velocities in belt haulageways; and Issue 3 - ventilation of escapeways. In addressing these issues, the BAAC considered a large amount of material and information, both written and oral. Based on the material and information received, the Committee concludes that regulations be promulgated by MSHA to: 1) specify the conditions under which air in the conveyor belt haulage entry can be used to ventilate working places, 2) require a minimum velocity for air in the conveyor belt entry when conditions warrant, and 3) assure the integrity of the mine atmosphere in the primary escapeway. In promulgating these regulations, the Agency should be guided by the following recommendations:

ISSUE 1: THE CONDITIONS UNDER WHICH BELT HAULAGE ENTRIES COULD BE SAFELY USED AS INTAKE AIRCOURSES TO VENTILATE WORKING PLACES.

Recommendations:

- Use of belt air Belt haulage entries can be safely used as intake aircourses to ventilate working places provided additional safety and health conditions are met. See Discussion, Recommendation Number 1, page 33.
- Atmospheric Monitoring Systems When belt haulage entries are used to ventilate working places, one of the additional conditions is the presence within the belt haulage entry of an early warning fire detection system. See Discussion, Recommendation Number 2, page 35.
- Training Miners should be trained in the basic principles of the early warning fire detection system and the actions required in the event of activation of a system alarm.

Appropriate personnel responsible for installation, maintenance, operation, and inspection of the system should be trained in their duties.

In the special case of the atmospheric monitoring system (AMS) operator, who is the person responsible for monitoring the system and, hence, initiating the Fire Fighting and Evacuation Plan, MSHA should assure, by examination of competency, the training and its effectiveness received by that person. At any time there are workers underground in an AMS-equipped mine,

there should be a trained operator within sight or sound of the surface control station. See Discussion, Recommendation Number 3, page 50.

- Velocity (belt air used at face) In mines using AMS as a condition for using air in the conveyor belt entry to ventilate working places, the minimum velocity in the belt haulage entry should be 50 feet per minute. See Discussion, Recommendation Number 4, page 56.
- Approval of AMS The Agency should move forward with the development and promulgation of approval schedules for early warning fire detection systems (including smoke sensors). Approval schedules should include performance standards as well as safety standards and should be flexible enough to permit advances in technology. See Discussion, Recommendation Number 5, page 59.
- Approval of conveyor belts It is the consensus of the Belt Air Advisory Committee that MSHA proceed rapidly to develop regulations for improved fire resistant belting, including new testing and approval schedules.

Notwithstanding the scope of the Committee Charter, the Committee recommends that, once available, the improved fire resistant belting material should be used in all underground coal mines. See Discussion, Recommendation Number 10, page 74.

- Alert and alarm levels In mines using belt air to ventilate working places, the alert and alarm levels for AMS should not exceed 5 ppm and 10 ppm CO (or equivalent) above ambient, respectively. The MSHA District Manager may establish lower alert and alarm levels for AMS based on the sensor type and sensitivity, sensor spacing, air flow, cross-sectional area and local mining conditions.

Alerts and alarms should be automatically activated on the surface and on the working section(s) when the CO (or equivalent) levels exceed the established levels. See Discussion, Recommendation Number 11, page 77.

- Housekeeping and maintenance In mines using belt air to ventilate working places, increased emphasis should be placed on belt entry cleanup and conveyor belt maintenance. See Discussion, Recommendation Number 12, page 79.

ISSUE 2: MINIMUM AIR VELOCITIES IN BELT HAULAGEWAYS

Recommendations:

- Velocity (belt air used at face) In mines using AMS as a condition for using air in the conveyor belt entry to ventilate working places, the minimum velocity in the belt entry should be 50 feet per minute. See Discussion, Recommendation Number 4, page 56.
- Velocities (maximum/minimum) Velocities, both minimum and maximum, should provide air that is capable of maintaining methane and dust levels at the levels specified in the standards.

The concentration of respirable dust in a belt conveyor haulageway used to ventilate the working place should not exceed 1.0 mg/m^3 at a point just outby the section tailpiece. The concentration of respirable dust at all other outby locations in belt haulageways should not exceed 2.0 mg/m^3 . Designated areas (DA) should be established at appropriate locations in the belt haulageway for dust measurement and should be identified in the Ventilation System and Methane and Dust Control Plan. See Discussion, Recommendation Number 6, page 61.

- Velocity (methane layering) The minimum air velocity in belt haulage entries in all mines, whether belt air is used to ventilate working places or not, should be established based on the ability of the air current to reduce the potential for methane layering. See Discussion, Recommendation Number 7, page 64.

ISSUE 3: VENTILATION OF ESCAPEWAYS

Recommendations:

- Lifelines Lifelines should be installed and maintained in all primary and alternate escapeways. Tracks and belts can be treated as acceptable lifelines provided that, where track switches and belt transfers exist, provisions are made for clear designation of the escape route. See Discussion, Recommendation Number 8, page 66.
- Escapeway ventilation Ventilation of the primary and alternate escapeways should consider the interfaces and interrelationships among all aspects of the mining system (e.g. the haulage system, the ventilation system, the production system, etc.).

Ventilation systems should be designed and maintained to protect the integrity of the mine atmosphere in the primary intake escapeway. Factors to be considered in this evaluation, on a mine-by-mine basis, should include the following:

- ° Prudent engineering to provide positive pressure differential from the primary escapeway to adjacent entries to the extent feasible and practical; and
- ° Planned, evaluated, and practiced use of devices to pressurize the primary escapeway in the event of an emergency that will require the use of the primary escapeway.

The alternate escapeway should be designed and maintained to maximize the possibilities of escape.

- ° Without precluding the use of a return entry or the considerations of other factors such as clearance and ground control in the choice of escapeway ventilation, the alternate escapeway should preferably be ventilated with intake air. If the alternate escapeway is in intake air, it need not be on a totally separate and distinct split of intake air, although physical separation is mandated.

Information submitted for ventilation plan approval should include substantiating data relative to the integrity of the mine atmosphere in the escapeways under normal and pressurized conditions.

- ° The methods used to evaluate the escapeway integrity should be based on measured data from the existing system and on experimental data using pressurizing devices. The use of analytical methods (e.g., computer-oriented network analysis of ventilation systems) is strongly advocated. See Discussion, Recommendation Number 9, page 69.

VI. DISCUSSION OF COMMITTEE RECOMMENDATIONS

This section of the Report sets out in some detail the Committee discussion leading up to each recommendation. It is not meant to be exhaustive of all Committee discussion of the recommendations. The reader is referred to the transcripts of the BAAC meetings for the full discussion by the Advisory Committee. The Committee emphasizes that the discussion portion of the Report should carry equal weight with the captioned portion of the recommendations and cautions against isolated statements being taken out of context thus altering the intent of the Committee.

RECOMMENDATION NUMBER 1

BELT HAULAGE ENTRIES CAN BE SAFELY USED AS INTAKE AIRCOURSES TO VENTILATE WORKING PLACES PROVIDED ADDITIONAL SAFETY AND HEALTH CONDITIONS ARE MET.

Statement of the Issue

One of the three charges to the Advisory Committee was to address the conditions under which belt haulage entries could be safely used as intake aircourses to ventilate working places. The Advisory Committee first examined the threshold question of whether or not belt haulage entries could be safely used as intake aircourses to ventilate working places.

Discussion

Presentations on the existing methods of ventilating conveyor belt entries made it very clear that they were inefficient and, in some cases, ineffective in accomplishing the goals of the regulation. They reduced available section air at the face, they often put belt air in the face inadvertently, and they had the potential for a belt, supposedly in a "neutral", to be, in reality, ventilated with return air. In case after case, the Committee was shown ventilation schemes that would have put combustion products from a fire on a belt, ostensibly in a neutral split, into the face area. The Committee received and reviewed the MSHA BEVR Report and other material, such as the transcript of the hearings held to receive the response of the public to the BEVR Report. Among other presentations, the Committee heard a detailed presentation of the contents of the BEVR Report by one of its contributing authors. A conclusion of the BEVR Report is that directing belt air to the face can be at least as safe as other ventilation methods provided carbon monoxide monitors or smoke detectors are installed in the belt entry.

The Committee accepted and endorsed the use, with conditions, of belt-entry air at the face.

Conclusion

All members of the Committee affirmed the recommendation.

RECOMMENDATION NUMBER 2

WHEN BELT HAULAGE ENTRIES ARE USED TO VENTILATE WORKING PLACES, ONE OF THE ADDITIONAL CONDITIONS IS THE PRESENCE WITHIN THE BELT HAULAGE ENTRY OF AN EARLY WARNING FIRE DETECTION SYSTEM.

Statement of Issues

Recommendation Number 2 identifies the need for improved fire detection systems for use in the conveyor belt haulage entries as the first of several conditions necessary if belt air is to be safely used to ventilate working places.

Discussion

In the past, reliability of the systems has been a major safety concern. The record contains a 1988 UMWA listing of a number of perceived deficiencies with AMS used for early warning fire detection and the results of a 1992 UMWA survey of AMS. The Committee heard and received evidence that the type of problems listed (moisture, dust, drift, batteries) are mostly a result of early design deficiencies and have been overcome as experience was gained in the use of mine-wide monitoring systems. Other problems, such as damaged transmission lines, printer failure, lengthy transmission lines, and trolley and phone interference can usually be associated with incorrect installation procedures or inadequate maintenance programs. The Committee heard evidence that if specified, installed, calibrated and maintained properly, there is no reason AMS would not be able to perform satisfactorily in underground coal mines.

For Recommendation Number 2, the Advisory Committee developed additional guidance for Agency consideration in administering the implementation of appropriate early warning fire detection systems. This additional guidance is based on language which has been effective in current MSHA petitions for modification, with additional safeguards added. It follows:

- Item 1: Actions before using belt air for face ventilation.
- Item 2: Capabilities of the AMS.
- Item 3: Minimum velocity and location of sensors.
- Item 4: Section alarms.
- Item 5: Responsible person at surface.
- Item 6: Actions of personnel underground upon alert/alarm activation.
- Item 7: Actions of personnel on the surface upon alert/alarm activation.
- Item 8: Avoidance of nuisance alerts.
- Item 9: Fire Fighting and Evacuation Plan contents; records.
- Item 10: AMS calibration, testing, examinations, and records.
- Item 11: AMS malfunction.

- Item 12: Mine ventilation map.
- Item 13: Smoke sensors; slippage switches.
- Item 14: Backup communication.

Item 1: Actions before using belt air for face ventilation

Prior to belt haulage entries being used to ventilate working places:

- a) Proposed changes should be outlined in the mine ventilation plan;
- b) Miners shall be trained in the basic principles of the early warning fire detection system and the actions required in the event of a section alarm;
- c) Appropriate personnel responsible for installation, maintenance, operation and inspection of the system should be trained in their duties; and
- d) The early warning fire detection system should be inspected by MSHA.

Discussion of Item 1: The Committee took up the issue of what should be done prior to belt haulage entries being used to ventilate working places. The Committee agreed that items such as airflow changes should be in the mine ventilation plan. Implementation of an AMS or changing over to a new system should also be in the plan, as opposed to being in a petition for modification. Various means to ensure the ability of the operator to use and maintain the AMS before beginning to actually use belt air for face ventilation were then discussed.

Item 2: Capabilities of the AMS

The early warning fire detection system should be capable of:

- a) Monitoring electrical continuity and detecting electrical malfunctions of the system;
- b) Identifying any activated or malfunctioning sensor; and
- c) Giving notice of a fire for a minimum of four hours after the source of power to the belt is removed, except when power is removed during a fan stoppage or the belt is examined as provided in section 75.1103-4 (e)(1) or (2).

Discussion of Item 2: During the discussion of this item, the issue of monitoring of electrical continuity and malfunctions was raised. The intent of the Committee was clarified to be that the system be capable of monitoring itself for electrical continuity and malfunctions.

Relative to the section dealing with identifying activated or malfunctioning sensors, the Committee addressed this during the discussions on alerts and alarms. The Committee determined that the information should be sent to a location on the surface of the mine where a responsible person is on duty.

The Committee discussed whether, when a belt is stopped, the AMS should be capable of continuing to operate for a period of four hours unless the belt is examined in accordance with 30 CFR 75.1103-4(e). This provision would not apply when power is required to be removed from underground areas of the mine during a fan stoppage. It was determined that the continued monitoring is important after the belt is stopped.

Item 3: Minimum velocity and location of sensors

In mines using belt air to ventilate working places, the minimum velocity in the belt haulage entry should be at least 50 fpm. An early warning fire detection system (low level carbon monoxide or equivalent) in belt haulage entries should monitor the atmosphere at the following locations:

- a) Belt entries utilized as intake aircourses, at intervals not to exceed 1,000 feet;
- b) At the section tailpiece or not more than 50 feet inby the tailpiece on the same split of air;
- c) One sensor at the drive unit area (belt drive, belt take-up, belt tailpiece or combination thereof) not less than 50 feet and not more than 100 feet inby on the same split of air; and
- d) When belt and track are in separate entries and are not separated by stoppings on section panels, a CO (or equivalent) sensor should be placed at the inby end of the section track.

Discussion of Item 3: The Committee, in discussing the issue of sensor spacing, recognized that the spacing, airflow rate, and sensitivity of the sensors are closely tied together. Dr. Jacobs, in discussing this, stated ". . . I think we need to make clear that a thousand foot doesn't provide the safety; what provides the safety is the ability to trigger the monitor." Another Committee member indicated that there may be occasions when spacings closer than 1,000 feet are warranted based on low air velocities. This concept was carried forward by the Committee in Recommendation Number 11 which states that alert and alarm levels should not exceed 5 and 10 ppm of CO, however lower levels may be established based on sensor type and sensitivity, sensor spacing, air flow, cross-sectional area and local mining conditions. During the discussion of Recommendation Number 11, the Committee recognized that limits exist on current technology relative to detection levels. The Committee feels that when it

not possible to lower alert and alarm levels it may be necessary to adjust sensor spacing and/or air velocity.

In the original proposal of the Fire Safety Subcommittee, it was proposed that when the belt and track entries were in separate entries that were not separated by permanent stoppings, sensors should be alternated on not greater than 1,000 foot spacings between the two entries. During discussions it was pointed out that this would result in spacings of up to 2,000 feet in the belt entry, which is in conflict with the 1,000 feet discussed previously. There was agreement by most members of the Committee that where the belt and the track are in common entries, the track should also be monitored. Nonetheless, it was pointed out that in some mines the requirement that additional monitors be installed at 1,000 foot intervals along the track could easily result in the capacity of an AMS being exceeded. The Committee decided that mines that are installing new systems or that have systems with sufficient capacity should be encouraged to stagger sensors in the belt and track entry so that each entry would be monitored. This type of installation was first suggested by Mr. Gallick during his presentation to the Committee.

Additional discussion led to the modification of paragraph (c) of this item to provide a range of belt entry length for location of the sensor. It was agreed that paragraph (c) should be revised to read "not less than 50 and not more than 100 feet in by on the same split of air". By providing this latitude for installation of the sensor at belt drive areas the Committee intends that the location provide the desired level of protection.

Item 4: Section alarms

Section alarms should give a visual and audible warning signal on the affected working section if carbon monoxide (or equivalent) reaches the established levels. The section alarm should be at a location where it can be seen or heard by persons working on the section.

Discussion of Item 4: The Subcommittee indicated that the language of their report concerning the location and type of section alarm addresses the problem at the Marianna mine where the dispatcher had trouble reaching personnel. A section alarm would be at a location where it can be seen or heard. The device would give a visual and audible warning signal on the affected working section if carbon monoxide (or equivalent) reaches the established levels. It was noted that some existing systems are quite old and alarms of the type recommended may not be possible. It was suggested that these could be permitted so long as alternative means which afford equal protection are provided and approved. Discussion followed over whether the alarms should be "seen or heard" or "seen and heard." The Committee carefully

examined this issue and decided that because not everyone is in a location where they can both see and hear the alarm the appropriate wording is "seen or heard."

Item 5: Responsible person at surface

At all times when miners are underground a responsible person(s) should:

- a) Be on duty on the surface, so that the alert/alarm signals can be seen or heard;
- b) Maintain a record of each alert and alarm signal and actions taken;
- c) Have 2-way communication with all working sections. When alert and alarm levels are reached, this person should notify personnel at working sections and other personnel who may be endangered;
- d) Be trained in the operation of the early warning fire detection system and emergency communication system.
- e) Be trained in the proper procedures to follow in the event of an emergency or malfunction; and
- f) Take appropriate action upon alarm activation and verification.

Discussion on Item 5: During the discussion of the operation of an early warning fire detection system, it became evident to the Committee that the location where alert and alarm signals are sent, both underground and on the surface, is critical. The point was made during discussions that while the location of the alarm may vary from mine to mine, the critical thing is that it be given at a location where it can be seen or heard.

The Committee had a lengthy discussion on the meaning of the term "responsible person". Some members of the Committee argued that the responsible person is responsible for the safety of the miners in the mine. Other members of the Committee, as well as members of the public, argued that the responsibility for the safety of the miners rests elsewhere and not solely with the person charged with monitoring the AMS on the surface. During the discussion this person was characterized as the person responsible for monitoring the system and, hence, initiating the Fire Fighting and Evacuation Plan. The Committee determined that initiation of the Fire Fighting and Evacuation Plan by this individual was the appropriate action.

Discussion of the Subcommittee report indicated that a key element in the use of an early warning fire detection system is the ability of the underground miners to obtain information relative to the location of a fire and the sensor that is in the alarm mode. The Committee determined that if following an alert or alarm miners were unable to contact the responsible person on

the surface, they should evacuate to an operable means of communication outby. Then based on their communication with the surface or continued inability to contact the surface, they should exit the mine. The Committee felt so strongly about the need for a reliable communication system that a recommendation was made in Item 14 that redundancy be provided.

Item 6: Actions of personnel underground upon alert/alarm activation.

When the early warning fire detection system reaches the alert/alarm mode, an audible and visual alarm signal should activate on the surface at the mine and at the working section(s). When section alert/alarms signals are activated the following actions should be taken:

- a) Alert - When alert levels are reached, the sensor that is activated is identified and section workers inby are notified of an "alert mode" and are withdrawn to a safe location outby the working places, unless the cause is known beforehand not to be a hazard. An examination is then made to determine the cause of activation.
- b) Alarm - When alarm levels are reached, the sensor that is activated is identified and all persons in the same split of air are withdrawn to a safe location outby the sensor activating the alarm, unless the cause is known beforehand not to be a hazard. An examination is then made and if a hazard exists the mine Fire Fighting and Evacuation Plan is implemented.
- c) During the alert/alarm mode the belt may, at the discretion of the mine operator, continue to operate until the area is examined.

Discussion of Item 6: The Committee discussed the possible locations where an alert or alarm signal should be sent. It was the feeling of the Committee that the location for the signal on the surface can vary. However, it was agreed that the location should be at the mine at a location where someone is on duty who can initiate the actions required.

The Committee then discussed the actions that should be taken when the alert and alarm signals are triggered. The Committee discussed the sequence of events following the activation of an alert and the location to which miners are to be withdrawn. The Committee determined that upon alert, withdrawal of persons to a location where communication is available is intended to be automatic. If an alarm is activated, the withdrawal would be outby the sensor which is in alarm. It was pointed out that this will require communication with the outside to determine the sensor that is causing the alarm. A question arose relative to the response if communication cannot be established. The

Committee decided that under these circumstances personnel should evacuate to an operable means of communication outby. Then based on their communication with the surface or continued inability to contact the surface, they should exit the mine.

The question of whether belts should continue to operate when an alarm is activated was discussed by the Committee. Recognizing that stopping a belt on a hot roller can increase the likelihood of a fire the Committee chose to suggest that operators be permitted but not required to continue to operate belts when alerts and/or alarms are activated.

Item 7: Actions of personnel on the surface upon alert/alarm activation.

In the event of an alert, personnel on the surface, except those necessary to investigate the cause of the alert, should not enter the affected area of the mine unless the cause of the alert is known beforehand not to present a hazard. In the event of an alarm, personnel on the surface, except those persons necessary to investigate the cause of the alarm, should not enter any area of the mine unless the cause of the alarm is known beforehand not to present a hazard.

Discussion of Item 7: As a result of material submitted by the UMW during their presentation at the Committee's sixth meeting, a discussion developed over the actions of personnel on the surface of the mine upon alert/alarm activation. The Committee agreed that persons necessary to investigate and take appropriate action should be permitted to enter the mine. However, the question of other personnel entering the mine was not as clear cut. Some Committee members suggested that persons other than those necessary to investigate the cause of the alert/alarm be permitted to enter the unaffected area of the mine. These members felt that this position was consistent with the evacuation procedures for persons underground, but also recognized that in some instances the affected area of the mine could be the entire mine. The majority of members felt that in the case of an alert, it would be acceptable for persons other than those necessary to investigate the cause of an alert to enter unaffected areas of the mine. The majority also felt that no one other than those necessary to investigate the cause or otherwise respond to an alarm should be permitted to enter the mine in the event of an alarm unless the cause of the alarm is known beforehand not to present a hazard.

Item 8: Avoidance of nuisance alerts

To avoid nuisance alert signals, the District Manager may approve a plan which requires incorporation of reasonable time delays or

other techniques (computer/administrative) into the alert/alarm signal system. The Committee determined that experience gained by the Agency during the petition for modification process could be used as a guideline. When a planned activity which may result in CO above the alarm levels being produced, such as cutting, welding, calibration, blasting, major equipment moves requiring the use of diesel equipment, etc., is scheduled, the person in charge of the activity should notify the responsible person at the surface monitoring station of:

- a) The location and type of activity;
- b) The time the activity begins; and
- c) The time the activity is completed.

Anticipated alerts/alarms require notification to sections inby on the same split of air prior to and after planned activities.

A fire check for hot spots is required after cutting and welding is performed. Should hot spots be found, they should be extinguished immediately.

Discussion of Item 8: The original report of the Fire Safety Subcommittee suggested that reasonable time delays or trending be permitted as a method of reducing nuisance alarms. It was suggested that the original reference to the use of trending was too restrictive and that other computer-control techniques may be usable. A Committee member proposed that "trending" be replaced with "other techniques" to provide operators with the option of using other methods. After some discussion, the term trending was replaced with the terminology "other techniques" to permit greater flexibility in the elimination of nuisance alarms.

The original report of the Subcommittee specified that as a means of reducing nuisance alerts the MSHA District Manager may approve higher alert and alarm levels. The Committee did not accept that part of the Subcommittee report that would have permitted changes to alert levels as a means of reducing nuisance alerts. There was considerable discussion on the changing of alert levels. The position was clarified that the purpose of allowing the District Manager to change alert levels was to establish an additional "low-low-level" such that alerts could be checked out prior to evacuation of the affected sections.

Further discussion centered around the need for nuisance alarm reduction to enhance miner confidence in the AMS, particularly in mines using diesel-powered equipment, and those resulting from blasting, and cutting and welding. During the discussion on planned activities Subcommittee members explained that the part of the item dealing with major equipment moves requiring the use of diesel was not intended to address the routine daily use of diesel equipment. It was explained that the need for notification under these conditions indicated that during major

equipment moves, the diesel equipment would be under heavy load and thus emitting higher volumes of exhaust.

Item 9: Fire Fighting and Evacuation Plan contents; records

Under 30 CFR 75.1101-23(a), the mine Fire Fighting and Evacuation Plan and subsequent revisions should incorporate the operation of the early warning fire detection system and at a minimum, should specify:

- a) The action to be taken to determine the cause of the alert and alarm signals;
- b) The location(s) for withdrawal of miners for alert and alarm signals; and
- c) The procedures to be followed if an alert or alarm signal is activated.

If an alert or alarm is activated, a record should be made of the date, time, location of sensor, concentration at the sensor and the reason for its activation. The records should be reviewed and initialed by management personnel on a monthly basis.

Discussion of Item 9: Under this item the Committee agreed that specific activities following the activation of alerts and alarms from an AMS should be covered under the provisions of the mine's Fire Fighting and Evacuation Plan. The Committee also discussed the need for records of alerts and alarms and that these records should be reviewed and made available to appropriate personnel, including management, MSHA, and the representative of the miners.

Item 10: AMS calibration, testing, examinations, and records

In order to maintain the early warning fire detection monitoring system in proper operating condition, the following activities should be performed:

- a) The monitoring system and sensors should be visually examined at least once each coal producing shift;
- b) Each sensor should be calibrated with a known concentration of carbon monoxide (or equivalent) and air mixtures, sufficient to activate the alarm, at intervals not exceeding 31 calendar days;
- c) Alert and alarm signals should be tested for operation at intervals not exceeding 7 days; and
- d) Inspection records should be maintained on the surface, recording the date and time of each weekly test of alert and alarm signals, calibration, and maintenance performed on the system. The records should be maintained for one year and made available to management, MSHA and mine personnel.

Discussion of Item 10: The Committee discussed the calibration, testing and visual examination of an AMS. During the discussion, it was suggested that testing of alert and alarm signals for operation be required at intervals not exceeding 7 working days. It was pointed out that 7 working days could be as much as 9 or even 11 calendar days and that during vacation, it could be 25 calendar days. The Committee determined that a 7-day interval for testing is appropriate.

Following a question by a member of the public, the Committee clarified that the records that should be maintained are the records of the weekly tests of alert and alarm signals, calibrations, and maintenance.

Item 11: AMS malfunction

If any portion of the early warning fire detection system malfunctions, the affected belt haulage conveyor may continue to operate. The responsible person should notify all sections affected. Once it has been determined that the cause is a malfunction, a qualified person(s) having access to communications with the responsible person on the surface should patrol the affected area and monitor for carbon monoxide or equivalent with a handheld detector(s) as outlined below for the period of time necessary to identify the problem and make necessary repairs:

- a) If one sensor becomes inoperative, a qualified person should monitor at that location;
- b) If two or more adjacent sensors become inoperative, a qualified person should patrol and monitor the area affected; and
- c) If the complete system becomes inoperative, a sufficient number of qualified persons shall patrol and monitor so the affected belt entries are traveled each hour in their entirety. If the failure lasts more than eight (8) hours, then the MSHA District Manager should be notified immediately.

Handheld carbon monoxide detectors (or equivalent) should be maintained in a working condition, and available for use in a timely manner.

Discussion of Item 11: The Advisory Committee discussed each provision in detail. It was emphasized that the handheld detectors are only intended to be used as a backup until the system problem is identified and repaired. A Committee member suggested that when used on a temporary basis handheld detectors are a very safe alternative. This Committee member stated that when there is a failure of the fire detection system the use of a handheld detector on a temporary basis can be more appropriate

than other action such as a withdrawal of miners. This member also pointed out that not only do you have the handheld detector, but also the ability of the miner to detect a fire through sight and smell. During the discussion on what period of time would be reasonable for use of handheld detectors it was stated that it was in the interest of the company to get the system back on line. A recommendation was made that a period of time be imposed where handheld detectors are acceptable during system failure. Some members of the Committee felt that the time period should be determined on a mine-by-mine basis. The Committee, after much discussion, recommended that if a system failure lasted more than 8 hours MSHA should be immediately notified. The reasons for notifying MSHA are to have the Agency assure that the corrective action is being taken and to keep the Agency informed of system failures.

Item 12: Mine ventilation map

The mine ventilation map should contain the details of the early warning fire detection system, including the type of sensor (CO or equivalent) and the sensor location and should be posted at the mine.

Discussion of Item 12: The Committee discussed the contents of mine plans and maps as they relate to early warning fire detection systems. There was agreement that the mine ventilation map should contain the details of the system, including the type and location of the sensors, and that the map should be posted at the mine. It was further agreed that a map should be posted in the control room and on the mine bulletin board. It was clarified that the information provided to the Agency relative to the system should for the most part not be subject to approval but rather should be submitted as information on the mine map.

Item 13: Smoke sensors; slippage switches

In mines using belt air to ventilate working places, slippage switches should be integrated into the early warning fire detection system. Where it is not feasible to do so, the switches should be visually examined each production shift. Smoke sensors (or equivalent) when commercially available, should be installed no more than 100 feet inby each drive.

Discussion of Item 13: The Subcommittee proposed that in lieu of smoke sensors, slippage switches or fire suppression systems should be integrated into the early warning fire detection system or that an additional fire suppression system such as a wall of water be installed. The Committee determined that the ultimate goal was to have reliable smoke sensors installed at belt drives. By permitting alternatives, the incentive for developing and

installing these sensors would be eliminated. It was determined that the Committee should recommend the installation of smoke sensors when these devices become commercially available. In addition, slippage switches should be integrated into the early warning fire detection system or, where this can not be done, these switches should be examined each shift.

Item 14: Backup communication

The communication system in use at the mine should be capable of providing backup communication to the working section(s). This redundancy may be in the form of; two communication lines, the use of one communication line plus another form of communication (e.g. leaky feeder, trolley, wireless, automatic alert/alarms, etc.), or any other equally effective system(s) selected by the operator.

In operations having only one means of verbal communication:

- (a) Transmission lines for the automatic section alarms and phone should be carried in separate entries; and
- (b) In the event of failure of the phone system, and the section receives an alarm, miners should be evacuated as required in the mine Fire Fighting and Evacuation Plan.

Discussion of Item 14: Throughout the discussions of the Subcommittee report and previous discussions on the use of air in the belt entry to ventilate working places, the Committee returned to the need for a reliable communication system. Dr. Kissell pointed out that having two communication lines in the same entry does not constitute redundancy because they would be subject to what are called "common cause failures."

The Committee was as concerned with the quality of the communication as with the redundancy. During the discussion of the report prepared by the Training Subcommittee, Dr. Saperstein stated: "We've become concerned again, as we looked through the training regulations, about communications and how critically important it is. And we think that where it says, 'shall be trained in the operation of the early warning fire detection system,' we should add, 'and of the emergency communication system' with the emphasis on 'emergency' in case there are differences in the system that is used during an emergency."

Discussion on Velocity Caps

At every meeting, the Committee discussed the need for establishing guidelines for air velocities when belt air is used to ventilate the working place. Committee members recognized

that velocity has a significant impact on the ability of monitoring systems to detect fires. High air velocities can result in significant dilution of the products of combustion generated by a fire in the belt haulage entry. While low air velocities can result in increased transport time for products of combustion from a fire to the next inby sensor, it is also recognized that higher velocities can increase fuel consumption rates during a fire and may also remove heat thus making it more difficult for a fire to start. AMS installed as a condition for permitting the use of belt air would rely on the products of combustion to identify a fire. If the levels of these products are diluted below the alert and/or alarm levels, a substantial fire could go undetected by the AMS. Committee Recommendation Number 11 is intended to address this concern. The recommendation would establish maximum alert and alarm levels at 5 and 10 parts per million but would allow the MSHA District Manager to set lower levels when conditions, including air flow, warrant. The Committee recognizes that limits exist on current technology relative to detection levels. A number of presenters indicated that alarm levels below 4 ppm may not be practical. Given these constraints, the Committee feels that when it not possible to lower alert and alarm levels it may be necessary to adjust sensor spacing and/or air velocity.

The Committee also recognized that while air velocity has an impact on the ability of AMS to detect fires, one of the primary goals of a ventilation system is to dilute methane and dust to acceptable levels. The Committee also considered the effect of velocity on dust entrainment.

During his presentation to the Committee, Mr. Thomas Rabbitt, UMWA International Health and Safety Representative, indicated that, given the nomographs in BOM RI 9380 and the capabilities of current monitoring systems, an absolute velocity cap does exist. The Committee felt that rather than establish an absolute cap, it was more appropriate to provide a mechanism for resolving the issue on a mine-by-mine basis, taking into account sensor type and sensitivity, sensor spacing, cross-sectional area and local mining conditions.

Mr. Rabbitt called on the Committee to formally endorse BOM RI 9380 as the means of establishing alarm levels and setting a velocity cap. The Committee did not endorse RI 9380. The Committee considered the data, had some concerns, and received additional expert input before reaching its conclusions. Dr. Ramani made the following statement for the record:

Madam Chairman, I would like to make a comment for the record on 9380. I have used it in making judgments about the spacing and the alarm and alert levels.

There have been some concerns on 9380 and I was delighted that an independent opinion² was sought on some of the concerns that the Committee had raised with regard to certain assumptions in calculating 14.25 minutes, as well as the nomographs.

This member of the Committee has no real concern regarding all the elements of 9380. There are elements that were raised, and I thought it was very worthwhile to have asked to get an opinion and I believe that the Committee recommendations with regard to the AMS and alarm alert levels took those comments into consideration.

The Committee expects that in establishing alert and alarm levels the Agency will be guided by all appropriate research including RI 9380 and Dr. Grosshandler's independent review.

Conclusion

All members of the Committee affirmed the recommendation.

² See discussion for Recommendation Number 4.

RECOMMENDATION NUMBER 3

MINERS SHOULD BE TRAINED IN THE BASIC PRINCIPLES OF THE EARLY WARNING FIRE DETECTION SYSTEM AND THE ACTIONS REQUIRED IN THE EVENT OF ACTIVATION OF A SYSTEM ALARM.

APPROPRIATE PERSONNEL RESPONSIBLE FOR INSTALLATION, MAINTENANCE, OPERATION, AND INSPECTION OF THE SYSTEM SHOULD BE TRAINED IN THEIR DUTIES.

IN THE SPECIAL CASE OF THE ATMOSPHERIC MONITORING SYSTEM (AMS) OPERATOR, WHO IS THE PERSON RESPONSIBLE FOR MONITORING THE SYSTEM AND, HENCE, INITIATING THE FIRE FIGHTING AND EVACUATION PLAN, MSHA SHOULD ASSURE, BY EXAMINATION OF COMPETENCY, THE TRAINING AND ITS EFFECTIVENESS RECEIVED BY THAT PERSON. AT ANY TIME THERE ARE WORKERS UNDERGROUND IN AN AMS-EQUIPPED MINE, THERE SHOULD BE A TRAINED OPERATOR WITHIN SIGHT OR SOUND OF THE SURFACE CONTROL STATION.

Statement of Issues

The Belt Air Advisory Committee makes recommendations in this portion of its Final Report for training that should accompany the installation and use of AMS in underground coal mines. The Committee believes that such systems are a useful adjunct to the reduction of reportable mine fires but recognizes that their utility is reduced if personnel do not understand how the AMS work or do not trust the information (signals and alarms) that they produce. Consequently, the Committee recommends training specific to AMS as a corollary to its recommendation that such systems should be installed in mines that use belt-entry air to ventilate the working face.

The question of training requirements for miners, their supervisors and the inspectorate, on fire detection, suppression, and evacuation procedures in the event of a fire is focused by an understanding of present training requirements found in the mine safety regulations. In general, all miners must receive initial training in safety procedures upon being hired, rehired, or engaging in a new task; additionally, they must receive annual retraining in safety and health (30 CFR Part 48). The task training is intended to be job specific and may include a demonstration of competency before miners may proceed independently with that task (30 CFR 48.27). Further, there are a number of identified positions in the underground work force that must be filled by persons qualified and/or certified to perform that job: supervisors, mine examiners, electricians, blasters, hoisting engineers, and those who check for gas, dust, and noise levels (30 CFR 70.202, 203, and 504 and 30 CFR 75.100 et seq.).

The types of training that are specified in the above sections of the CFR vary from the purely didactic, such as classroom lectures and demonstrations found in safety training, to clinical or laboratory experiences that are given to qualified persons. These latter modes may include simulations, controlled experiences with actual equipment but out of the mine, controlled instruction in the mine, and on-the-job training. Instruction may be given by MSHA personnel, but more frequently it is given by MSHA-certified cooperative instructors employed by mining companies or by education institutions, both private and public. When non-MSHA personnel do the instruction, they must teach in accordance with a training plan that is approved by MSHA (30 CFR 48.23).

Most of the required training programs are meant to be competency based; this implies that students pass the program when they achieve a minimally acceptable level of competency in the particular subject. There are no further gradations in determining the educational outcome of the course. The annual safety training programs are not tested for student outcome. However, many of the qualification programs are. For example, the regulations are quite specific that one of three ways that a person may become qualified to perform electrical work in a coal mine is to achieve a score of 80 percent in each of five written tests (30 CFR 75.153(d)). Other qualifications are tested by a less specific examination.

Discussion

AMS are increasingly a part of detecting a fire as well as detecting the activation of fire suppression systems. Consequently, as part of a total package of training for fire safety, the unique attributes of AMS must be communicated to the work force by means of training. Furthermore, since the activation of an AMS alarm for a product of combustion implies an emergency and an inherently stressful situation, this training needs to be of sufficient depth to encourage appropriate responses in the midst of stress. To give structure to this training, the duties and responses associated with operation of the AMS should be part of the MSHA-approved Fire Fighting and Evacuation Plan.

Committee discussion included the following points: 1) the need to specify training for maintenance personnel; 2) an understanding of outcome assessment; 3) specific definition of the capabilities of the control room personnel; 4) supervisory training; 5) the inspectorate; and 6) staffing levels.

For maintenance personnel (point 1), it was pointed out that the overall objective is to have reliable AMS operation. This goal could be specified in a performance standard that would not specifically address the skills required by maintenance

personnel. This approach would demand performance and leave its achievement to the mine operator. The Committee took the approach that personnel who install and maintain the system be trained. Whenever electrical work is performed, it should be done under the supervision of a qualified electrician. Obviously, support personnel working under the supervision of a qualified electrician do not themselves have to be qualified. Equally, outside experts brought in to work on the system, provided that they are accompanied by a qualified electrician when they do the work underground, do not have to be qualified.

Outcome assessments of training (point 2), in particular that given to workers designated as the responsible person in the control room, was discussed in depth by the Committee. The assessment of the Committee is expressed by the phrase "examination of competency" in the recommendation. The training given to control room personnel must be effective and must be seen to be effective. Consequently, the MSHA-approved training plan for these personnel should show both the training plan and the manner of examination that will be used to test the workers. The examination does not have to be written; indeed, there is merit in having a performance-based evaluation.

The Committee discussed the need to assure the competency of control room personnel by creating a new category of "qualified" personnel (point 3). There was much discussion surrounding the meaning of, and standards associated with, the term. The Committee determined that the appropriate phrase was "responsible person." The responsibility, specified in the recommendation, is for "monitoring" the system and, hence, initiating the Fire Fighting and Evacuation Plan. The Committee was specific that these responsibilities should be detailed in each mine's Fire Fighting and Evacuation Plan.

The Committee considered the existing MSHA training regulations for supervisory personnel (point 4). It determined that the Agency should consider examining the existing regulations in the context of assuring adequate training to supervisory personnel in the areas of fire evacuation and AMS operation.

The Committee reviewed the potential training needs of the MSHA inspectorate (point 5). In the case of company personnel who examine, calibrate, and otherwise inspect the AMS, their task-training should be part of the training plan of the company. Requirements for training Federal mine inspectors are not specified in the CFR, but are internal to the Agency. Nonetheless, the Committee was clear in specifying that MSHA inspectors be trained. The Committee would also encourage MSHA to work closely with the States to see that their inspectors are adequately trained.

Finally, the Committee discussed the need for companies to provide a sufficient number of trained persons to perform maintenance and to staff the control room (point 6). A number of Committee members expressed the opinion that when persons are scheduled to be in the mine, trained personnel should be available on each shift to repair and maintain the AMS and to provide control room staffing in the event the individual normally assigned this duty is unavailable.

Kinds of Training

All mine personnel who receive Part 48 training in AMS will probably be served adequately by lecture and demonstration if they are supplemented by appropriate fire drills. However, the other categories of training should require hands-on and in-mine training experiences. After basic classroom lectures and demonstrations, specialized laboratory training may be needed. For example, system operators could receive simulated exposures to various types of alarms and fires. Maintenance personnel could trouble-shoot actual sensors and control boxes. Examinations can be based around these realistic simulations.

Alertness

It is well accepted that people behave unpredictably in an emergency unless they are trained with sufficient intensity to react properly. Because mine fires are rare events, the Committee is concerned that the training recommended in this section of the Report will be superfluous unless it is reinforced by repeated drills. Therefore, the Committee recommends that the escapeway drill requirements contained in MSHA regulation published on May 15, 1992 (30 CFR 75.383) incorporate the appropriate AMS signals and alarms. Equally, the personnel designated as system monitors should be part of each fire drill and should take appropriate action as specified in the approved Fire Fighting and Evacuation Plan. Continued participation would assure that the AMS will be effective in a real emergency.

Specific Training Requirements

The Committee also identifies five categories of personnel who will benefit from training in the role of AMS in fire safety: 1) all underground miners, 2) supervisory personnel, 3) AMS monitoring personnel, 4) AMS maintenance personnel, and 5) inspectors. As addressed by Recommendation Number 3, each of these five groups is intended to receive training specific to their roles and functions with respect to an AMS.

1. Underground Miners. Hourly, sometimes referred to as classified (in union mines), workers are required to undergo safety training when newly hired, when rehired after more than a

year's hiatus, and when moved to a new task. They are also required to have annual retraining. The Committee believes that the following subjects should be made part of this training:

- a) The effect of a fire on the mine's ventilation system;
- b) Evacuation procedures and drills for fires;
- c) The role of AMS in detecting fires;
- d) Methods of fire suppression used; and
- e) The need to protect and maintain fire safety equipment including AMS detectors and lifelines.

Retraining should be specific to any system changes that have been installed. Procedures for the separate escapeway drills required by the present 30 CFR 75.1704-2(e) should be amended to incorporate the activities of an early fire warning system.

2. Supervisory Personnel. Rulemaking is underway to require all underground mine supervisors to receive training under Part 48. The Committee believes that supervisors must participate in the annual retraining of miners by not only training the miners but also by receiving training in actions to be taken whenever the Fire Fighting and Evacuation Plan is activated. Supervisors should understand the operations of the specific early fire warning system that is in their mine. They should have intimate knowledge of the role expected of them in an actual fire and evacuation emergency. They, also, should understand their role when certifying records. MSHA is urged to review its supervisory training requirements in this regard.

3. AMS Monitoring Personnel. Under the ventilation rule published by MSHA on May 15, 1992 each AMS, when installed, is required to have "a person designated by the operator" to be at a surface location to monitor the AMS and to transmit signals and alarms to the working sections of the mine (30 CFR 75.351). The Committee believes that this person's skills should be ensured by appropriate training and MSHA-approved evaluation of the person's competency in the job. The requirement for a trained person to be in place while anyone is underground implies that the mine operator will need to be concerned about backup or substitute personnel.

The Committee recognizes the variety of responsibilities and authority given by the company to these personnel. Some companies may choose to use hourly personnel in a monitoring and advisory role while other companies may choose to use management personnel to whom have been delegated independent decision-making authority with respect to implementing the Fire Fighting and Evacuation Plan. Regardless of the level of authority possessed by the control room operator, it is clear to the Committee that the well-being of the mine and its workers is critically dependent upon this person doing the job well.

At a minimum, training for AMS control room personnel should include the following:

- a) The general safety training received by all miners;
- b) Familiarity with the mine and the AMS system installed at the mine;
- c) An understanding that is more extensive than that taught routinely in the general safety programs of the effects of a fire on the mine ventilation system;
- d) The mine's fire and evacuation procedures;
- e) Functions during a fire drill, and consequently, during a fire itself;
- f) Emergency communications;
- g) System calibration;
- h) System problems and trouble-shooting; and
- i) Recordkeeping.

4. Maintenance Personnel. The Committee suggests that those personnel who are responsible for repairing and maintaining an AMS should be qualified as electricians and should be trained in the specifics of the system. This training would be part of task training. This requirement would not be extended to those specialists, such as representatives of the manufacturer, who are called in to assist with major repairs. Non-qualified personnel should not be permitted to work underground independently. Maintenance personnel should be trained in:

- a) System operation;
- b) Calibration and trouble shooting; and
- c) System repair.

While inappropriate as a regulatory requirement, the Committee suggests that the training for maintenance personnel be done, as much as possible, in concert with the system manufacturer.

5. MSHA Mine Inspectors. The Committee was shown part of a training program in AMS for mine inspectors. It is assumed that all underground inspectors will have this training if they are to inspect a mine with an AMS installation. The Committee recognizes that training requirements for MSHA inspectors are internal to the agency and do not appear in the CFR. Therefore, while not recommending regulation, the Committee believes strongly that, in addition to generic training, all mine inspectors should be trained in the specific AMS that they will encounter in the mines. They should also learn about calibration procedures and recordkeeping for those systems.

Conclusion

All members of the Committee except for Mr. Holt affirmed the recommendation. Mr. Holt stated that he did not disagree with the overall concept; however, he felt that the training requirements should be more reflective of Part 48. In particular, he stated that the requirement for competency testing for an AMS operator should be performance based as is required under similar occupations.

layer[ing], whichever velocity is the higher." The recommendations of the Committee, here and in Recommendation Number 7, are consistent with both of these goals.

Another factor considered by the Committee in discussing this recommendation was the research presented in BOM RI 9380. According to this research, the average time for a small coal fire to ignite a conveyor belt was 14.25 minutes. It was recognized that a small coal pile fire sufficient to ignite the belt would produce products of combustion sufficient to activate the sensors. This is expressed in the conclusion of RI 9380 as follows:

A constraint was proposed that may be used to define the conditions for use of proposed CO and smoke fire detection systems. For CO or smoke fire sensors, this constraint defines the sensor spacings and alarm thresholds for a range of air velocities and entry cross-sectional areas.

This constraint, derived from the data presented in this report and designed to approximate worst-case conditions for ignition of conveyor belting by a small precursor coal fire, defines the condition for sensor usage so that fire detection and alarm occurs just prior to ignition of conveyor belting.

Using the spacing recommended in Recommendation Number 2 (1,000 feet) and a 50 fpm air velocity, the maximum time for the products of combustion to travel from the fire to the next downwind sensor would be 20 minutes. The BOM researchers however, in discussing transport times, stated, "In general, the location of fires along conveyor belt entries is most uncertain. As a consequence, the probability that a fire will occur very close to a sensor is the same as for a fire occurring one sensor spacing from the sensor. On average, then, CO or smoke will have to be transported a distance equal to one-half the sensor spacing, l_s ." Using this rationale, the time against which the 14.25 minutes should be compared would be 10 minutes. In his response to the Committee's request for an independent evaluation of the data and conclusions of RI 9380 Dr. William L. Grosshandler, Head, Exploratory Fire Technologies, U. S. Department of Commerce, National Institute of Standards and Technology, stated, "I don't agree with the authors' reasoning for the factor of one half used in eq.(18). It is true that on the average, the distance between the fire and sensor would be one half the detector spacing; however, since the ventilation flow is in only one direction, a detector just upstream of a fire may never detect it because the combustion products would be convected downstream. When one considers that the combustion products are being continuously transported downstream (rather than a plug flow of accumulated products as assumed in eqs. (19)

and (20), a transient transport time is more properly written as follows:

$$t_t = l_g/60v_o[1-\exp(-v_o t/l_g)].$$

This equation would yield a coefficient different from $\frac{1}{2}$, ranging from 1.0 for long transport times to zero for short transport times." The equation for determining the transport time as expressed in RI 9380 is as follows:

$$t_t = \frac{1}{2}[l_g/60v_o].$$

The Committee also discussed the effect of multiple "neutral" entries on the ability to maintain the 50 fpm minimum in the belt entry. The Committee recognized that it may be necessary to provide this minimum in all the entries in order to assure that this minimum is achieved in the belt entry. This subject was raised again during a discussion on the need to separate the belt and track entries. It was noted that current regulations require that the velocity in the track entry be limited to 250 fpm, and that this may require limiting the velocity in the belt entry as well if the belt and track are not separated. In both instances, the Committee chose to leave the method of implementing the requirements to the operator and the Agency.

Conclusion

All members of the Committee except for Dr. Ramani affirmed the recommendation. Dr. Ramani felt that the 50 feet per minute minimum velocity was not supported by an adequate rationale and that he preferred a higher minimum velocity to assure the products of combustion would be transported to the sensors more quickly.

RECOMMENDATION NUMBER 5

THE AGENCY SHOULD MOVE FORWARD WITH THE DEVELOPMENT AND PROMULGATION OF APPROVAL SCHEDULES FOR EARLY WARNING FIRE DETECTION SYSTEMS (INCLUDING SMOKE SENSORS). APPROVAL SCHEDULES SHOULD INCLUDE PERFORMANCE STANDARDS AS WELL AS SAFETY STANDARDS AND SHOULD BE FLEXIBLE ENOUGH TO PERMIT ADVANCES IN TECHNOLOGY.

Statement of Issues

Initial discussions centered around the fact that MSHA only evaluates monitoring systems for intrinsic safety and does not have approval schedules defining minimum performance standards for AMS. The issues included lack of guidelines to which AMS manufacturers may refer for guidance in determining system reliability or accuracy requirements, certain minimum performance standards which must be met by all AMS to assure miner safety, and standards for reliability, maintenance, calibration, and compatibility. Manufacturers, mine operators and miners representatives are concerned that performance standards for AMS are not in place.

Discussion

Initially, a concern was expressed that there were a number of different brands of monitoring systems in use and that this situation might represent a large variation in system performance parameters. The question was raised as to whether continuation of this situation would be advisable if mines begin using belt air without petitions for modification. It was noted that AMS performance standards were on the Agency's rulemaking agenda.

During discussions it was determined that AMS sensors undergo an intrinsic safety evaluation but not a performance evaluation. Only systems used as a condition of a petition for modification have performance criteria imposed. The Committee discussed the impact of Agency AMS performance standards rulemaking on the scope of its own recommendation process.

The Committee expressed a need for additional information before being in a position to have the methodology to understand the reliability of monitoring systems. Arrangements were made for a panel of AMS manufacturers to address the Committee's concerns. Mr. Len Blatnica, Product Line Manager, MSA, stated that there are no performance criteria to which any of these systems have to conform. The goal of the manufacturers is to build a reliable system that can be used in the industry and, one that the industry can afford and will purchase. Current approvals are centered around intrinsic safety. There are no performance criteria. Mr. Al Ketler, President, Rel-Tek Corporation, stated

that manufacturers are looking for guidance in this area. He further stated his delight in the Committee getting involved in this and perhaps moving forward with some guidelines.

Mr. Joseph Main, Administrator, Department of Occupational Safety and Health, UMWA, stated that there is a need for AMS performance standards and noted operational problems with system installations. Mr. John Dower of NIOSH supported the need to develop minimum performance requirements for AMS to assure proper evaluation of the mine atmosphere. System compatibility standards, developed in Great Britain for British systems, were discussed. The need to develop standards for reliability, maintenance, compatibility, and calibration was proposed.

Characteristics of monitoring systems were divided into two groups; (1) those parameters, such as sensor alert and alarm levels, which require approval during the plan approval process, and (2) those parameters, such as reliability and sensitivity, that should meet MSHA approval schedules.

The Committee discussed the need for alarm levels to be set consistent with sensor sensitivity. Upon discussion, the draft recommendation was amended to include smoke sensors. The Committee heard that efforts are underway to develop a technique for discriminating between fires and diesel emissions. The Committee encouraged research and development of discriminating sensors and would advocate their use in mines where diesel equipment is used when commercially available as a means of reducing nuisance alarms.

Conclusion

All members of the Committee affirmed the recommendation.

RECOMMENDATION NUMBER 6

VELOCITIES, BOTH MINIMUM AND MAXIMUM, SHOULD PROVIDE AIR THAT IS CAPABLE OF CONTAINING METHANE AND DUST LEVELS AT OR BELOW THE LEVELS SPECIFIED IN THE STANDARDS.

THE CONCENTRATION OF RESPIRABLE DUST IN A BELT CONVEYOR HAULAGEWAY USED TO VENTILATE THE WORKING PLACE SHOULD NOT EXCEED 1.0 MG/M^3 AT A POINT JUST OUTBY THE SECTION TAILPIECE. THE CONCENTRATION OF RESPIRABLE DUST AT ALL OTHER OUTBY LOCATIONS IN BELT HAULAGEWAYS SHOULD NOT EXCEED 2.0 MG/M^3 . DESIGNATED AREAS (DA) SHOULD BE ESTABLISHED AT APPROPRIATE LOCATIONS IN THE BELT HAULAGEWAY FOR DUST MEASUREMENT AND SHOULD BE IDENTIFIED IN THE VENTILATION SYSTEM AND METHANE AND DUST CONTROL PLAN.

Statement of Issues

Concerns were expressed regarding the need to establish minimum and maximum air velocity limitations. Presentations by BOM and industry personnel, other expert testimony, and published research provided documentation for establishing limits in regard to methane and dust control. The issues included dust entrainment by high velocity air flow, and the ability of the ventilation system to maintain general-body methane at acceptable levels.

Discussion

The discussions began with the determination of a need to establish both minimum and maximum velocities that provide air that is capable of maintaining methane and dust levels at the levels specified in the MSHA standards.

During his presentation to the Committee, Mr. Mitchell recommended a maximum velocity based on a summation of the velocities of the belt and the air. Mr. Mitchell offered rationale for three different relative velocities of 1,200, 1,500 and 2,000 fpm. He further stated that the limits are based solely on the concept of limiting the entrainment of dust into the air, and reflect different levels of entrainment. As an alternative, Mr. Mitchell recommended float dust sampling. It was pointed out, and Mr. Mitchell agreed, that entrainment is also a function of the wetness of the coal.

Presentations by Messrs. Jankowski and Haney provided detailed information on respirable dust entrainment and the dust dilution effect obtainable through the use of belt air as intake. Mr. Haney stated that, if the increase in velocity is caused by restriction, then dust levels due to entrainment will increase;

however, if the increased velocity is a result of an increased air quantity, dilution compensates for entrainment, and the dust levels will not significantly change. He added that entrainment was observed in velocities at around 2,000 fpm. He also added that the use of belt air can increase or decrease face exposures; however, the change will generally not be significant. Mr. Jankowski stated that there are several different mechanisms that generate dust along belt lines, and that dust controls for the belt entry are available and have been evaluated and found to be very effective. For example, there are belt scraper systems to clean the top side of the belt, and different types of systems to clean the underside of the belt, reducing the dust as the conveyor goes through the rollers and the return system. Limitations on a maximum velocity were proposed such that methane concentrations would conform to existing regulation requirements and yet not entrain dust.

The Committee discussed the following proposed language: "Concentration of respirable dust in the intake air coursed through a belt conveyor haulageway shall not exceed 1.0 mg/m^3 . Compliance shall be determined by establishing a designated area (DA) at a point within 50 feet outby the section tailpiece or just outby any air split point introduced into the entry." A maximum velocity limitation as a health concern was discussed. A proposal was put forward to provide the District Manager with criteria for the establishment of designated areas for dust sampling to assure compliance with 30 CFR 70.100.

The Committee discussed at length the issue of respirable dust levels within the belt entry when belt air is used to ventilate the face. The Committee incorporated language into this recommendation that would specify a lower requirement for dust in the belt entry at a point just outby the section and that would address the concerns of Committee members for protecting the health of persons working at other locations in the belt entry. The Committee decided that, although 30 CFR Part 70 permits designated areas to be established within belt haulage entries, clearly multiple designated areas should be established in the case of mines using belt air. The Committee decided that in order to assure that the dust concentration in the air in the belt entry does not exceed 1.0 mg/m^3 just before it goes onto the section, a designated area should be established at a point no more than 50 feet outby the tailpiece.

The Committee also recognized that sufficient air quantities and therefore air velocities must be provided to maintain methane levels in the belt haulage entry within acceptable limits. The

Committee determined that regardless of the function of the belt entry as an intake aircourse for ventilation, velocities must be consistent with compliance for methane and dust standards not only at the working face but within the belt haulage entry.

Conclusion

All members of the Committee affirmed the recommendation.

RECOMMENDATION NUMBER 7

THE MINIMUM AIR VELOCITY IN BELT HAULAGE ENTRIES IN ALL MINES, WHETHER BELT AIR IS USED TO VENTILATE WORKING PLACES OR NOT, SHOULD BE ESTABLISHED BASED ON THE ABILITY OF THE AIR CURRENT TO REDUCE THE POTENTIAL FOR METHANE LAYERING.

Statement of Issues

The Advisory Committee discussed issues related to the need to establish minimum velocities in belt haulage entries. The issues included the need for a minimum air velocity to reduce the likelihood of methane layering and transporting of the products of combustion between sensors in mines using AMS.

Discussion

The discussion began by examining the need for a minimum velocity for air in the belt haulage entry. During presentations by Mr. Dalzell and Mr. Mitchell, the position was presented that velocities in the belt haulage entry should be sufficient to reduce the likelihood of methane layering. Mr. Dalzell tied this minimum to the ability to maintain turbulent flow which he stated requires a velocity of at least 40 fpm. Mr. Mitchell, during questioning following his presentation, concluded that ". . . the minimum velocity should be either 50 fpm or that velocity necessary to militate against methane layering, whichever velocity is the higher."

The Committee distinguished between methane layers and methane accumulations in high spots or cavities. It was recognized that a minimum velocity alone cannot be expected to eliminate methane accumulations in high spots but can reduce the likelihood of methane layering.

Past work of Bakke and Leach on methane layering was discussed. This work concluded, inter alia, that the minimum velocity required to reduce methane layering was dependent on the methane liberation rate of the mine seam. Material was presented from "A Manual of Mine Ventilation Design Practices," 2nd Edition, 1983, by Floyd Bossard and Associates. In this publication, Mr. Bossard presents a method for determining the velocity necessary to control methane layering as a function of the methane liberation and the "layering number" used to characterize conditions in an entry. Using the data presented, the minimum velocity needed was determined to be about 35 fpm for a methane liberation of 0.1 cubic feet per minute and a layering number of 2.

This Advisory Committee recommendation is tied to Recommendation Number 4 which requires a minimum velocity of 50 fpm in the belt

entries of mines using belt air. The Committee's recommendations on the issue of minimum velocities are consistent with the position of Mr. Mitchell that in belt air mines the minimum velocity should be either 50 fpm or that velocity necessary to militate against methane layering, whichever velocity is the higher.

One member of the Committee expressed the opinion that the issue of methane layering was already covered in the regulations and objected to the recommendation. This member felt that the requirements for methane levels to be less than those specified in the regulations eliminated the need for the recommendation. It was pointed out that the limits for methane in the regulations dealt with general body concentrations and not layers. A concern was also expressed that there may be a lack of understanding of what a methane layer is and that the problem is limited to some very gassy mines.

The primary factors to consider in establishing a minimum velocity in belt haulage entries were determined by the Committee to be the reduction of methane layering and the transportation of the products of combustion between AMS sensors. The Committee concluded that minimum velocities should be established for the control of methane layering and that in mines using air in the belt entry, the minimum velocity should be sufficient to transport products of combustion between AMS sensors.

Conclusion

All members of the Committee except for Dr. Ramani and Mr. Holt affirmed the recommendation. Dr. Ramani felt the phrase "potential for methane layering" was not sufficiently quantified or defined. Mr. Holt did not feel the scope of the Advisory Committee Charter encompassed setting a minimum air velocity limit for non-belt air mines.

RECOMMENDATION NUMBER 8

LIFELINES SHOULD BE INSTALLED AND MAINTAINED IN ALL PRIMARY AND ALTERNATE ESCAPEWAYS. TRACKS AND BELTS CAN BE TREATED AS ACCEPTABLE LIFELINES, PROVIDED THAT, WHERE TRACK SWITCHES AND BELT TRANSFERS EXIST, PROVISIONS ARE MADE FOR CLEAR DESIGNATION OF THE ESCAPE ROUTE.

Statement of Issues

The Committee heard considerable testimony relative to the ability of miners to escape through smoke. As an aid to escape, a number of presenters suggested the use of lifelines in all escapeways.

Discussion

The Committee heard several presenters advocate the use of lifelines in escapeways. During his presentation Mr. Mitchell stated that he was in favor of the use of lifelines but only in non-active entries. He had observed that lifelines placed in active entries were quickly destroyed due to activity, and their repair was not considered a priority by mine management. In reporting on BOM research Dr. Kissell stated that the use of lifelines by themselves had the potential for saving more than 30 minutes during an escape through smoke and that when lifelines were used in conjunction with self-contained self rescuers more than 60 minutes could be saved.

During a discussion of the cost of installing lifelines, a member of the public stated that the cost was "nominal" considering the safety benefits. Considerable emphasis was placed on the need to maintain lifelines after they are installed. During the discussion on maintenance it was argued that for someone travelling in heavy smoke a broken lifeline could result in a panic situation. With this in mind, the Committee added the words "and maintained" to the recommendation. The Committee also emphasized the need for MSHA to enforce strongly the maintenance of lifelines once they are installed.

The Committee considered whether the benefits of lifelines were limited to belt air mines and determined that they were not. Accordingly, the Recommendation was written to address all underground coal mines.

The Committee discussed the replacement of reflectors in escapeways with lifelines. Some Committee members felt strongly that the lifelines must be used as additions to the reflective system, not in replacement of it. They stated that a damaged lifeline could leave a miner without direction in a low visibility escape situation and that the use of both lifelines

and reflectors offers the advantage of redundancy. The use of directional cones was suggested as a method of increasing the effectiveness of lifelines.

The use of lifelines was accepted as a positive element of the escape system. Maintenance of the lifelines is seen as critical to their function and to the miners' confidence in them.

Conclusion

All members of the Committee affirmed the recommendation.

RECOMMENDATION NUMBER 9

VENTILATION OF THE PRIMARY AND ALTERNATE ESCAPEWAYS SHOULD CONSIDER THE INTERFACES AND INTERRELATIONSHIPS AMONG ALL ASPECTS OF THE MINING SYSTEM (E.G., THE HAULAGE SYSTEM, THE VENTILATION SYSTEM, THE PRODUCTION SYSTEM, ETC.)

VENTILATION SYSTEMS SHOULD BE DESIGNED AND MAINTAINED TO PROTECT THE INTEGRITY OF THE MINE ATMOSPHERE IN THE PRIMARY INTAKE ESCAPEWAY. FACTORS TO BE CONSIDERED IN THIS EVALUATION, ON A MINE-BY-MINE BASIS, SHOULD INCLUDE THE FOLLOWING:

- ° PRUDENT ENGINEERING TO PROVIDE POSITIVE PRESSURE DIFFERENTIAL FROM THE PRIMARY ESCAPEWAY TO ADJACENT ENTRIES TO THE EXTENT FEASIBLE AND PRACTICAL; AND
- ° PLANNED, EVALUATED, AND PRACTICED USE OF DEVICES TO PRESSURIZE THE PRIMARY ESCAPEWAY IN THE EVENT OF AN EMERGENCY THAT WILL REQUIRE THE USE OF THE PRIMARY ESCAPEWAY.

THE ALTERNATE ESCAPEWAY SHOULD BE DESIGNED AND MAINTAINED TO MAXIMIZE THE POSSIBILITIES OF ESCAPE.

- ° WITHOUT PRECLUDING THE USE OF A RETURN ENTRY OR THE CONSIDERATIONS OF OTHER FACTORS SUCH AS CLEARANCE AND GROUND CONTROL IN THE CHOICE OF ESCAPEWAY VENTILATION, THE ALTERNATE ESCAPEWAY SHOULD PREFERABLY BE VENTILATED WITH INTAKE AIR. IF THE ALTERNATE ESCAPEWAY IS IN INTAKE AIR, IT NEED NOT BE ON A TOTALLY SEPARATE AND DISTINCT SPLIT OF INTAKE AIR ALTHOUGH PHYSICAL SEPARATION IS MANDATED.

INFORMATION SUBMITTED FOR VENTILATION PLAN APPROVAL SHOULD INCLUDE SUBSTANTIATING DATA RELATIVE TO THE INTEGRITY OF THE MINE ATMOSPHERE IN THE ESCAPEWAYS UNDER NORMAL AND PRESSURIZED CONDITIONS.

- ° THE METHODS USED TO EVALUATE THE ESCAPEWAY INTEGRITY SHOULD BE BASED ON MEASURED DATA FROM THE EXISTING SYSTEM AND ON EXPERIMENTAL DATA USING PRESSURIZING DEVICES. THE USE OF ANALYTICAL METHODS (E.G., COMPUTER-ORIENTED NETWORK ANALYSIS OF VENTILATION SYSTEMS) IS STRONGLY ADVOCATED.

Statement of Issues

The third issue that the Advisory Committee was to consider was the ventilation of escapeways.

The Committee determined that in an emergency it is critical that miners be provided with a route of escape that, to the extent possible, is free of contaminants. The Committee concluded that the best way to assure this contaminant-free route would be to provide a positive pressure differential from the escapeway to adjacent entries.

Discussion

The Advisory Committee Subcommittee on Escapeways reviewed the approaches that have been followed to protect the health and safety of miners underground from the threats to the integrity of the mine atmosphere posed by emergencies. The three historical approaches followed are:

- (1) Eliminating the occurrence of emergencies, or decreasing the possibility for their occurrence. Actions here have addressed eliminating the basic causes, providing more stringent equipment specifications, more vigorous testing and approval processes, and improved mine designs and operational practices including automation, remote control, personnel selection and training programs;
- (2) Increasing the possibility for early detection of the precipitating emergency to increase the time available to mount an effective response. Actions have included installation of early warning systems, AMS, better communication systems and implementation of more effective emergency response plans; and
- (3) Increasing the possibility for successful evacuation and escape, in the event of an actual emergency. Actions have included development of SCSRs, improved methods of ground control, escapeways, lifelines, and emergency drills.

Continuing advancements in all three of these areas have decreased both the number of emergencies and the probability of total mine involvement in the event of an emergency. The Committee addressed all three areas within the context of the Committee's charter on the ventilation of escapeways.

The Committee has heard evidence of problems encountered due to contamination of the atmosphere in the intake escapeways from fires in adjacent entries. The Committee has reviewed the relevant MSHA regulations, including the escapeway provisions in the MSHA proposed rule and final rule for safety standards for underground coal mine ventilation. The Committee also saw data on the direction of airflow between the intake escapeway and adjacent entries under normal working conditions and under simulated emergency conditions including the use of pressurizing

devices. The Committee has reviewed the BOM technical papers on the ranking of factors with regard to escape from fires and on the potential and relative roles of smoke and carbon monoxide.

Considering these presentations and data, the Committee was convinced that protecting the integrity of the mine atmosphere in the escapeway during an emergency takes on utmost importance as miners are trained and advised to use these entries as the primary means for evacuation and escape. The Committee believed that it is desirable, even during the normal operation of the mine, to maintain the integrity of the mine atmosphere in the escapeways by providing positive pressure differentials between the escapeways and the adjacent entries. Although the idea of maintaining a positive pressure differential from the primary escapeway to adjacent entries is widely accepted, there were some dissenters. Dr. Kissell and Mr. Litton stated that any intentional pressure differential would also mean predictable leakage. Leakage might be into the escape entry as the location of a fire is unpredictable.

The Committee considered other means for assuring the integrity of the mine atmosphere in the primary escapeway and determined that the primary escapeway should be maintained free of potential fire sources, such as diesel-powered, and battery-powered and other electrical equipment, unless such sources are equipped with a fire-suppression system installed and maintained in accordance with the provisions of 30 CFR 75.1107-3 through 75.1107-16.

It was noted that 30 CFR 75.1704 requires separate and distinct escapeways, at least one of which must be ventilated by intake air. Escapeway provisions in the new ventilation rule also require two separate and distinct escapeways. The latter requires that the escapeway ventilated by intake air be designated as the primary escapeway. The Committee concluded that it is desirable that the alternate escapeway also be ventilated by intake air. The Committee recognizes that, in some cases, other mine design requirements (e.g., ground control and clearance problems) may require that the alternate escapeway be ventilated by return air. While physical separation between the two escapeways is necessary, the Committee did not feel that it is necessary that the alternate escapeway, if located in the intake, be in a distinct and separate split of intake air. Such additional requirements may render the design and maintenance of the ventilation of the entire mine difficult.

The Committee intended to permit air to be provided to the alternate escapeway through point feeds from the primary escapeway when the alternate escapeway is in the belt entry and when it is necessary. This will also permit both escapeways to be supplied with air from the same shaft or slope opening. The ventilation system design with regard to the primary intake escapeway is a most important consideration and the Committee

recommended that every effort be directed to developing a ventilation plan to ensure the integrity of the mine atmosphere in this escapeway during both normal and emergency situations.

The Committee considered the need to provide sufficient air quantity in the belt entry and recognized that in some instances it may be necessary to supply this air from the primary escapeway through a point feed. The Committee determined that controlled point feeding is superior to ventilation through leakage. When point feeding is necessary, the Committee determined that point feeding from the intake escapeway into the belt entry can be done under the following conditions:

- ° A monitoring point (CO/smoke or equivalent) should be established before the air is mixed;
- ° Construction of the point feed should be of durable and noncombustible material or equivalent;
- ° The point feed should be provided with a means for closing during evacuation without the need for miners to enter the air stream passing through the point feed; and
- ° The velocity at the point feed should be sufficient to prevent air reversal.

The Committee further determined that, while point feeding from the primary escapeway may be appropriate, it is never appropriate to point feed into the primary escapeway from any other aircourse.

In designing a ventilation system, the location of the primary escapeway with regard to the belt entry, other haulage entries, the alternate escapeway, and the return entries is important. For example, the committee heard evidence on the advantages of locating the belt in a return entry, for overall mine design and mine ventilation system design, particularly with regard to protecting the integrity of the mine atmosphere in the primary intake escapeway. The Committee recognized that these benefits may be offset by the additional hazards and concerns that may be introduced in such an arrangement.

A mine development plan with a large number of entries in the mains and sections affords great flexibility in the ventilation system design for the location of the primary intake escapeway. In two-, three- and four-entry developments, the choice of the primary intake escapeway location is limited, and greater care is needed to ensure the integrity of the mine atmosphere at all times. Combinations of measured and computer-simulated data presented to the Committee indicated that ventilation system design to maintain a positive pressure differential between the

primary escapeway and adjacent entries is feasible. In all cases, the ventilation control devices isolating the primary intake and the alternate escapeways from the other entries should, in addition to being durable and noncombustible, be substantially engineered, constructed and maintained to reduce leakage.

The Committee was presented data on the results of pressurizing the primary intake escapeway during emergencies through the use of such devices as drop curtains, fire doors, check curtains and parachute stoppings. These devices may pressurize the primary intake escapeway, although other devices such as booster fans may achieve a similar result. The use of booster fans to pressurize mine areas is widespread in the international mining industry. The Committee recognized the complexity and the importance of the relationship between the location of any device used to pressurize the intake escapeway and their operational characteristics (either alone or in concert) with regard to the location of the emergency (e.g., the fire location) and recommended additional research studies in this important area.

The Committee realized that the overall mining design and development must consider all aspects of the mining system (e.g., production methods, roof-and-strata support system, haulage system and ventilation system). The evaluation of the plan and action items of the ventilation system must address the interfaces and the interrelationships among these systems with particular regard to the ventilation of the escapeways and the integrity of the primary intake escapeway. The evaluation must be based on measured data from existing systems and experimental data obtained using pressurizing devices. For new mine design and extensions of existing mine circuits, the use of analytical methods (e.g., computer analysis of ventilation plans) to evaluate the integrity of the mine atmosphere in the escapeways under normal and pressurized conditions is strongly recommended. The evaluation of the integrity of the mine atmosphere in the primary escapeway and of the information submitted to the Agency must assure, based on available data and best judgment, the maintenance of this integrity.

The information submitted to the Agency for ventilation plan approval should include substantiating data on the integrity of the mine atmosphere in the primary escapeway under normal and pressurized conditions.

It was noted that the ventilation system should be designed and maintained to protect the integrity of the primary intake escapeway. The operators could protect the integrity of the primary escapeway through a combination of several of the following redundant protective measures, implemented subject to

the approval of the MSHA district manager on a mine-by-mine basis:

- a) Engineering to provide positive pressure differential from the primary escapeway to adjacent entries;
- b) An early warning fire detection system in the belt entry;
- c) Additional protective measures at the belt drive locations, such as properly located smoke sensors when commercially available and proven to be reliable, the slippage switch integrated into the early warning fire detection system, the fire suppression system integrated into that early warning fire detection system, and additional fire suppression such as a wall of water inby and outby the drives; and
- d) The use of devices to pressurize the primary escapeway in the event of an emergency that would require the use of the primary escapeway.

During the discussion on this recommendation the Committee discussed the need for balancing air quantities between the primary escapeway and the belt entry. In discussing this it was stated that quantity does not ensure the integrity of the escapeway in all cases. It was pointed out that in those cases where the leakage is into the primary escapeway, reduced air quantities in the escapeway could result in increased contaminant levels in the escapeway.

The Committee chose to adopt the position that pressurizing the primary escapeway through the method of design or device was the best technique by which to protect the integrity of the mine atmosphere.

Conclusion

All members of the Committee affirmed the recommendation.

RECOMMENDATION NUMBER 10

IT IS THE CONSENSUS OF THE BELT AIR ADVISORY COMMITTEE THAT MSHA PROCEED RAPIDLY TO DEVELOP REGULATIONS FOR IMPROVED FIRE RESISTANT BELTING, INCLUDING NEW TESTING AND APPROVAL SCHEDULES.

NOTWITHSTANDING THE SCOPE OF THE COMMITTEE CHARTER, THE COMMITTEE RECOMMENDS THAT ONCE AVAILABLE, THE IMPROVED FIRE RESISTANT BELTING MATERIAL SHOULD BE USED IN ALL UNDERGROUND COAL MINES.

Statement of Issues

Through discussion and expert testimony from industry, labor and manufacturers, the Committee heard that the current standards and testing for conveyor belt material are inadequate. In addition, Mr. John Murphy, the Research Director of the Pittsburgh Research Center of the BOM, stated in the Reston hearing that:

. . . improved fire resistant conveyor belts, if used in all mines, would significantly reduce the risk of serious belt fires. All other findings and observations relative to the effect of air flow and belt flammability, the relative effectiveness of different fire sensing systems, [are] second order effects compared to the results that would be achieved through the use of improved fire resistant conveyor belt material.

Based on the information before it, the Committee determined that it should take a position with respect to the type of belt material used in underground coal mines.

Discussion

The current standard for flame testing of belt material is found in 30 CFR 18.65. The test requirement for belt material is a maximum duration of flame of one minute and a maximum of a three minute afterglow, both maximums after the removal of the applied flame.

Discussions on the relationships of belt fires, and velocity and air direction were presented to the Committee by expert testimony. The Committee heard that many factors come into play in belt fires and little prediction could be made as to the effects. Further, the effects are greatly dependent on fire size and location of the fire within the mine ventilation scheme. Dr. Lazzara showed a video tape illustrating the burning of a belt and its effects.

A panel comprised of conveyor belt manufacturers presented a discussion on conveyor belt flammability. A member of the panel stated that years of manufacturing experience has shown that there are three key points in a combustion scenario that need to be addressed involving underground conveyor belting. First, the belt should not give rise to ignition within itself. Second, if the belt should be subject to an external fire, with the removal of the source or the extinguishment of the ignition source, the belt should self-extinguish. And third, if the ignition source remains, the belt should not propagate the fire. The panelist stated that MSHA should consider a requirement for belt testing that would introduce the basic protections typified in standards used throughout the rest of the world and felt that it will result in an increase in worker safety.

Another member of the panel stated that his company has developed an improved flame-retardant rubber conveyor belt that would meet or exceed the BOM proposed belt evaluation laboratory test (B-E-L-T) requirements. The panelist acknowledged that a revision to the 23-year old MSHA standard is probably in order. The panelist further stated that his company has committed resources to supporting the coal industry and requests guidance pertaining to the critical factors defining the most desirable conveyor belt flame retardant, ignition or smoke properties.

Other panelists stated that their companies were prepared to manufacture a mine belting that conforms to the BOM proposed test.

A question was posed indicating that if manufacturers can develop a product that emits a strong, easily detectable odor, that could be very desirable from a safety point of view. A panelist responded, "If [producing a strong, detectable odor is] desirable, we need to know that and then we can probably provide that sort of characteristic." The panelist further stated that conveyor belts can be compounded to reduce or increase the amount of CO, smoke and odor produced during the various stages of the combustion process.

A panelist stated that, "The Committee has to decide what's most important? What's second most important? What's third most important? And it may be that we can develop something that addresses belt in the sequence that you establish that provides the best safety. But I don't know what best safety is."

Some of the more current petitions for modification already require that belting which meets a higher standard than that required by the existing regulation be used when the material is available.

The Committee felt that adequate information was available to establish new and more stringent requirements on the flammability

of conveyor belt material. It recommended that all information to date be brought to bear and new standards for testing and approval of belt material be rapidly developed. Once new standards for testing and approval are developed, the material approved under the standards should be placed in all underground coal mines.

It is the intention of the Committee that once new standards for belting material are in place and the new belting material is available, the existing material not be used over an extended period of time. It is not the intention of the Committee that belts currently in mines be replaced. The Committee discussed whether to recommend that vendors' and operators' supply inventory of belting material existing as of the date of new standards for belting material be permitted to be used. After hearing presentations on how quickly inventories would quickly be consumed and replaced by the improved belting, the Committee was satisfied that a supply of belting in inventory would not be used over an extended period of time.

Conclusion

All members of the Committee affirmed the recommendation.

RECOMMENDATION NUMBER 11

IN MINES USING BELT AIR TO VENTILATE WORKING PLACES, THE ALERT AND ALARM LEVELS FOR AMS SHOULD NOT EXCEED 5 PPM AND 10 PPM CO (OR EQUIVALENT) ABOVE AMBIENT, RESPECTIVELY. THE MSHA DISTRICT MANAGER MAY ESTABLISH LOWER ALERT AND ALARM LEVELS FOR AMS BASED ON THE SENSOR TYPE AND SENSITIVITY, SENSOR SPACING, AIR FLOW, CROSS-SECTIONAL AREA AND LOCAL MINING CONDITIONS.

ALERTS AND ALARMS SHOULD BE AUTOMATICALLY ACTIVATED ON THE SURFACE AND ON THE WORKING SECTION(S) WHEN THE CO (OR EQUIVALENT) LEVELS EXCEED THE ESTABLISHED LEVELS.

Statement of Issues

The Committee discussion of issues included whether a District Manager should have the discretion to establish alert and alarm levels below the accepted 5 or 10 PPM above ambient for unusual conditions. Another issue was whether the alert and alarm signals should be by automatic activation to the surface and to working sections or whether the AMS operator should intervene before a signal is given to the working section.

Discussion

The discussion of the District Manager's role in setting lower alert and alarm levels centered around unique mine conditions. Conditions have existed in mines which made the selection of lower levels quite prudent. This was seen as a valuable enforcement tool in special situations.

The automatic activation of the alert and alarm signals on the surface and at the working section would ensure that this critical information was disseminated without delay. Allowing even the best intentioned AMS operator to "check" before giving the signal for alert or alarm to working sections and the surface could prove disastrous.

The availability of records of AMS output and alert and alarm actions was discussed. Most petitions for modification state that records must be kept of maintenance and other functional tests of the AMS. The Committee took this to mean that information from the AMS was to be available to MSHA enforcement personnel.

The recommendation was made by Committee members that the recordkeeping on the AMS be detailed. This detail should be sufficient to allow historical analysis, provide trending and

pattern identification, and describe alert and alarm event actions.

The recommendation allows the District Manager the latitude to select more restrictive (lower) alert and alarm levels, and requires automatic signaling of alert and alarm conditions to working sections and the surface. These conclusions were reached in a desire to achieve a flexible yet highly responsive AMS.

Conclusion

All members of the Committee affirmed the recommendation.

RECOMMENDATION NUMBER 12

IN MINES USING BELT AIR TO VENTILATE WORKING PLACES, INCREASED EMPHASIS SHOULD BE PLACED ON BELT ENTRY CLEANUP AND CONVEYOR BELT MAINTENANCE.

Statement of Issues

Lack of maintenance of the conveyor belt and cleanup of the belt entry have resulted in belt entry fires. The problem appears to continue to exist in both belt air mines and non-belt air mines.

Discussion

During the meeting in Pittsburgh and again during the meeting in Lexington, the Committee heard presentations relative to the fire at the Marianna Mine. One of the primary causes of this fire was identified as a large amount of coal spillage in the area of the belt drive. Mr. Luzik, in his presentation and in subsequent information provided to the Committee, supplied data on ignition sources for fires that occurred in the belt entry. A review of this material indicated that several of the fires that have occurred since 1978 were the result of frictional ignition of coal that subsequently ignited the belt.

The Committee was also provided with information and transcripts of testimony from various public hearings, much of which dealt with the subject of coal spillage and float coal dust accumulations. Copies of citations on this subject provided during these hearings had previously been summarized. The summary was provided to the Committee. Although of no statistical benefit, the summary did indicate that a significant number of citations are issued by MSHA for belt entry cleanup and belt maintenance.

A review of the material supplied by the UMWA to the Committee revealed that the problem apparently continues to exist. Information contained in survey reports submitted by the UMWA in their 25-mine survey (13 belt air mines and 12 non-belt air mines) included information relative to coal spillage, float coal dust, and belt maintenance. While the Committee did not have an opportunity to independently investigate these situations, the type of problems discussed is consistent with the testimony of miners at Reston and at other public hearings.

Recognizing that these conditions can exist in all mines, the Committee, notwithstanding its charge to address belt-air mines, urges that increased emphasis on belt entry cleanup and belt maintenance extend to all underground coal mines. The Committee also recognizes that this emphasis must be initiated by all parties including industry, labor and government and intends that

each organization take a proactive role in addressing this problem.

A technique called "benchmarking"³ was discussed as one reasonable means for reducing the hazard of coal accumulations and other housekeeping problems. A Committee member suggested that those mines with the best housekeeping practices should be studied, using this technique, with the intent of uncovering helpful techniques that could be implemented in other mines.⁴

Conclusion

All members of the Committee except for Mr. Holt affirmed the recommendation. Mr. Holt felt the phrase "increased emphasis" was vague and subject to misinterpretation.

³ "Benchmarking is an ongoing investigation and learning experience that ensures that best industry practices are uncovered, analyzed, adopted and implemented." Robert Camp, Xerox Corporation

⁴ David Garvin, writing in Harvard Business Review, stated, "Truly excellent companies use benchmarking as a catalyst and enabler of change, a learning process rather than a scorecard. They scan the world widely for organizations skilled in what they do, visit them to understand their process, and use the findings to stretch their imaginations and develop new way of operation."

VII. RESEARCH NEEDS

During the course of its deliberations, the Committee identified several areas where it felt additional research is warranted.

The committee solicited information from NIOSH, BOM, and various conveyor belt manufacturers regarding the nature of smoke and gases released during frictional heating and combustion of belt materials used in mines and their hazardous properties. Dated information submitted by NIOSH has shown that, depending on the stage of fire growth, ventilation, and mine materials involved, toxic smoke containing multiple gases, vapors and particulates are generated that may have the potential for adverse health consequences for exposed miners. Presentations from belt manufacturers have indicated that modern (fire-resistant) conveyor belts are constructed from different compounds from the belt materials previously evaluated. The mining community could benefit from an update of information relative to the toxic and other health effects related to exposure to the products of combustion from these various belt materials.

The Committee discussed at length the various types of AMS sensors, such as carbon monoxide and smoke. The availability and reliability of AMS detectors for other low level products of combustion generated by fire-resistant belt frictional heatings and combustion (e.g., HCl) may warrant further investigation.

The Committee heard that efforts are underway to develop a technique for discriminating between fires and diesel emissions. The Committee encourages research and development of discriminating sensors.

The Committee viewed video tapes and heard presentations relative to miners removing the mouthpieces of their SCSR's during escape in order to permit communication. The Committee recognizes the importance of communication during these periods and encourages research and development of SCSR's that permit voice communication without removal of the mouthpiece.

The Committee heard several presentations relative to the use of devices to pressurize the primary intake escapeway. These include parachute stoppings, fire doors, drop curtains, booster fans, and other devices. The Committee recognizes the complexity and the importance of the relationship between the location of these devices and their operational characteristics (either alone or in concert) with regard to the location of the emergency (e.g., the fire location) and their impact on the total ventilation system and recommends additional research studies in this area.

During discussions relative to housekeeping, the Committee heard that a large number of citations are issued by the Agency for poor housekeeping and dust control practices along conveyor belt haulageways. A suggestion was made that a review be conducted of the practices used by mines that have demonstrated high standards in dust control and have a low incidence of citations for maintenance and dust control violations along conveyor belt haulageways.

The Committee recognizes that certain mine design systems, such as locating conveyor belts in return aircourses, can offer the potential of enhancing protection of the atmosphere in the primary escapeway. However, the Committee also recognizes that there are safety concerns which exist when belts are installed in return aircourses. As such, the Committee recommends that the Agency evaluate of historical data on mining systems with belts in returns to determine the advantages and/or disadvantages of each system in regard to protecting air quality within primary escapeways.

Appendix A

ADVISORY COMMITTEE CHARTER

1. The Committee's official designation.

Advisory Committee on the Use of Air in the Belt Entry to Ventilate the Production (Face) Area at Underground Coal Mines and Related Provisions.

2. The Committee's objectives and the scope of its activity.

The Committee is established in accordance with the requirements of sections 101(a) and 102(c) of the Federal Mine Safety and Health Act of 1977 (Mine Act) and the Federal Advisory Committee Act. The purpose of the Committee is to review MSHA's belt entry air proposal, including related provisions and other technical data. To the extent possible, the Committee will make consensus recommendations with respect to: (1) the conditions under which belt haulage entries could be safely used as intake air courses to ventilate working places; (2) minimum velocities in conveyor belt haulageways; and (3) ventilation of escapeways.

3. The period of time necessary for the Committee to carry out its purpose.

The Committee must make recommendations to the Secretary within 180 days of the date of its first meeting.

4. The Agency or official to whom the Committee reports.

The Secretary of Labor.

5. The Agency responsible for providing the necessary support for the Committee.

Mine Safety and Health Administration, U.S. Department of Labor.

6. A description of the duties for which the Committee is responsible.

The Committee will review the Agency's proposal on the use of belt entry air in underground coal mines. To the extent possible, it will also make consensus recommendations to the Secretary of Labor concerning the conditions under which belt entry air could be safely used in the face areas of underground coal mines.

7. Membership.

As required by section 102(c) of the Mine Act, the majority of the Committee will be composed of individuals who have no economic interests in the mining industry and who are not operators, miners, or officers or employees of the Federal government or any State, or local government. There will be nine Committee members: two representing labor, two representing industry, and five who have no economic interests in the mining industry and who are not operators, miners, or officers or employees of the Federal Government or any State, or local government.

8. The estimated annual operating costs in dollars and staff years for the Committee.

Estimated annual operating costs: \$300,000

Estimated staff years: 4

9. The estimated number and frequency of Committee meetings.

The Committee will hold approximately 6 meetings during a 6 month period. The meetings will be held on a monthly basis.

10. The Committee's termination date.

This Committee will terminate 180 days from the date of its appointment.

11. The date the charter is filed.

This charter is filed on the date indicated below.


Secretary of Labor

June 27, 1991
Date

Lewandowski, 4220 Madison Avenue, Kansas City, MO 64111. Peterson Manufacturing Company (Peterson), a noncarrier, seeks to acquire control of Renzenberger, Inc. (RI) and Mid-American Van Pool, Inc. (MAVP). Renzenberger holds authority in No. MC-170517 as a: (1) Common carrier to transport passengers, in charter and special operations, between points in the United States; and (2) contract carrier to transport train crews, between points in the United States, under continuing contract(s) with railroad companies. MAVP holds authority in No. MC-238671, as a common carrier to transport passengers, in charter and special operations, (1) between points in California, Nevada, Utah, Wyoming, Colorado, Nebraska, Kansas, Oklahoma, Texas, Iowa, Missouri, Arkansas, Louisiana, Illinois, and Tennessee; and (2) beginning and ending at points in the same 15 states and extending to points in the United States (except Alaska and Hawaii).

Don R. Armacost owns 50 percent (the largest block) of the stock of Peterson, and upon Peterson's acquisition of the stock of RI and MAVP, Mr. Armacost, a noncarrier individual will be in control of two regulated motor carriers subject to our jurisdiction.

Decided: June 4, 1991.

By the Commission, Motor Carrier Board.
Sidney L. Strickland, Jr.,
Secretary.

[FR Doc. 91-13949 Filed 6-11-91; 8:45 am]
BILLING CODE 7035-01-M

[Finance Docket No. 31889]

Burlington Northern Railroad Co., Illinois Central Railroad Co., and Union Pacific Railroad Corp.—Trackage Rights Exemption—Joppa and Eastern Railroad Co.

Joppa and Eastern Railroad Company (J&E) has agreed to grant: (i) Local trackage rights to Burlington Northern Railroad Company (BN), Illinois Central Railroad Company (ICR), and Union Pacific Railroad Corporation (UP) over approximately 2.5 miles of its line between those portions of the north and south wyes leading from the BN main line east of Kelley, and milepost 2.52, at Neff, in Massac County, IL; (ii) local trackage rights to UP over the rail line and related properties J&E leases from Missouri Pacific Railroad Company between mileposts 359.5 and 362, north of Joppa, in Massac County (the Leased Track); and (iii) overhead trackage rights to BN and ICR over the Leased Track. The primary purpose of the transaction is to allow BN, ICR, and UP

to use J&E's owned and leased track to serve the facility of Electric Energy, Inc., near Joppa. The trackage rights were to be consummated on June 3, 1991.

This notice is filed under 49 CFR 1180.2(d)(7). Petitions to revoke the exemption under 49 U.S.C. 10505(d) may be filed at any time. The filing of a petition to revoke will not stay the transaction. Pleadings must be filed with the Commission and served on: John R. Molm, Troutman, Sanders, Lockerman & Ashmore, 127 Peachtree Street, suite 1400, Atlanta, GA 30303-1810.

As a condition to the use of this exemption, any employees affected by the trackage rights will be protected pursuant to *Norfolk and Western Ry. Co.—Trackage Rights—BN*, 394 I.C.C. 605 (1978), as modified in *Mendocino Coast Ry., Inc.—Lease and Operate*, 360 I.C.C. 653 (1980).

Dated: June 5, 1991.

By the Commission, David M. Konschnik,
Director, Office of Proceedings.
Sidney L. Strickland, Jr.,
Secretary.

[FR Doc. 91-13948 Filed 6-11-91; 8:45 am]
BILLING CODE 7035-01-M

[Finance Docket No. 31884]

The Metropolitan Railway Co., Inc.—Corporate Family Transaction Exemption—the Indiana & Ohio Railway Co.

The Metropolitan Railway Company, Inc. (MRC), and The Indiana & Ohio Railway Company (IORY) filed a notice of exemption for MRC to lease to IORY its entire line of railroad, the Blue Ash Secondary, between milepost 49.5 #, at Cincinnati, OH, and milepost 50.5 #, at Norwood, OH, including the McCullough Yard track, a total distance of approximately 1 mile.

MRC and IORY are wholly-owned subsidiaries of The Indiana & Ohio Rail Corp. (I&O). The proposed transaction, which was to be consummated on or about May 28, 1991, is intended to facilitate the interchange of traffic between the I&O system and CSX Transportation, Inc., and other carriers.

Because MRC and IORY are members of the same corporate family, the lease falls within the class of transactions that are exempt from the prior review requirements of 49 U.S.C. 11343. See 49 CFR 1180.2(d)(3). The transaction will not result in adverse changes in service levels, significant operational changes, or a change in competitive balance with carriers operating outside the corporate family.

As a condition to use of this exemption, any employees affected by

the lease will be protected by the labor conditions set forth in *Mendocino Coast Ry., Inc.—Lease and Operate*, 354 I.C.C. 732 (1978), and 360 I.C.C. 653 (1980).

Petitions to revoke the exemption under 49 U.S.C. 10505(d) may be filed at any time. The filing of petitions to revoke will not stay the transaction. Pleadings must be filed with the Commission and served on Robert L. Calhoun, Sullivan & Worcester, suite 806, 1025 Connecticut Avenue, NW., Washington, DC 20036.

Decided: June 6, 1991.

By the Commission, David M. Konschnik,
Director, Office of Proceedings.
Sidney L. Strickland, Jr.,
Secretary.

[FR Doc. 91-13950 Filed 6-11-91; 8:45 am]

BILLING CODE 7035-01-M

DEPARTMENT OF LABOR

Mine Safety and Health Administration

Advisory Committee; Establishment

AGENCY: Mine Safety and Health Administration (MSHA).

ACTION: Notice of establishment of advisory committee.

SUMMARY: The Secretary of Labor has determined that it is in the public interest to establish an advisory committee to make recommendations concerning the conditions under which air coursed through the belt entry could be safely used in the face areas of underground coal mines. The committee will provide a collective expertise not otherwise available to the Secretary to address the complex and sensitive issues involved.

DATES: Comments must be received on or before June 27, 1991.

ADDRESSES: Send comments to the Office of Standards, Regulations, and Variances; Mine Safety and Health Administration; room 631; Ballston Tower #3; 4015 Wilson Boulevard; Arlington, Virginia 22203.

FOR FURTHER INFORMATION CONTACT: Patricia W. Silvey, Director, Office of Standards, Regulations, and Variances, MSHA, (703) 235-1910.

SUPPLEMENTARY INFORMATION: On January 27, 1988, MSHA published in the *Federal Register* (53 FR 2382) a proposed rule to revise the Agency's existing ventilation standards for underground coal mines. Included in the proposal were provisions to allow the use of belt entry air to ventilate the face areas of underground coal mines. Public hearings

were held in June 1988 and the record closed on August 19, 1988.

In 1989, the Assistant Secretary for Mine Safety and Health requested a special study to review safety and health questions surrounding the ventilation of belt conveyor entries. The report, released in August 1989, reviewed major aspects of the issues surrounding the use of air coursed through belt conveyor entries to ventilate working places in underground coal mines. As many of the findings and recommendations made in the report relate to issues in the ventilation rulemaking, MSHA reopened the rulemaking record to receive public comment on the relevant portions of the report and held a seventh public hearing in April 1990. The ventilation rulemaking record closed on May 18, 1990.

In accordance with the provisions of the Federal Advisory Committee Act and after consultation with the General Services Administration, I have determined that the establishment of an advisory committee on the use of belt entry air to ventilate the face areas of underground coal mines is in the public interest. I am therefore establishing the committee under sections 101(a) and 102(c) of the Federal Mine Safety and Health Act of 1977 (Mine Act) and the Federal Advisory Committee Act.

The committee will make recommendations to me with respect to conditions under which belt air could be safely used in the face areas of underground coal mines. These recommendations will be based on draft provisions developed by MSHA during the ventilation rulemaking, and other technical data.

As required by section 102(c) of the Mine Act, the majority of the committee will be composed of individuals who have no economic interest in the mining industry and who are not operators, miners, or officers or employees of the Federal government or any State or local government. There will be nine committee members: Two representing labor, two representing industry and five persons with no economic interest in the industry.

The committee will function solely as an advisory body and in compliance with the provisions of the Federal Advisory Committee Act. Its charter will be filed under the Act fifteen days from the date of this publication.

Interested persons are invited to submit comments regarding the establishment of the committee to Patricia W. Silvey, Director, Office of Standards, Regulations, and Variances,

MSHA, at the address listed above.

Dated: June 6, 1991.

Lynn Martin,
Secretary of Labor.

[FR Doc. 91-13913 Filed 6-11-91; 8:45 am]

BILLING CODE 4510-43-M

LEGAL SERVICES CORPORATION

Grant Award for Provision of Civil Legal Services to Migrant Farmworkers

AGENCY: Legal Services Corporation.

ACTION: Announcement of grant award.

SUMMARY: The Legal Services Corporation hereby announces its intention to award a grant to provide civil legal assistance to LSC-eligible migrant farmworker clients in Tennessee. Pursuant to the Corporation's announcement of funding availability in Volume 56, No. 49, pages 10577 and 10578 of the Federal Register of March 13, 1991, a total of \$12,527 will be awarded to Legal Services of Upper East Tennessee.

This one-time grant is awarded pursuant to authority conferred by sections 1006(a)(1)(B) of the Legal Services Corporation Act of 1974, as amended. This public notice is issued pursuant to section 1007(f) of this Act, with a request for comments and recommendations within a period of thirty (30) days from the date of publication of this notice. The grant award will not become effective and grant funds will not be distributed prior to expiration of this thirty-day period.

DATES: All comments and recommendations must be received on or before the close of business on July 12, 1991, at the Office of Field Services, Legal Services Corporation, 400 Virginia Avenue SW., Washington, DC 20024-2751.

FOR FURTHER INFORMATION CONTACT: Phyllis Dorlot, Manager, Grants & Budget Division, Office of Field Services (202) 863-1837.

Date Issued: June 7, 1991.

Ellen J. Smead,
Director, Office of Field Services.

[FR Doc. 91-13947 Filed 6-11-91; 8:45 am]

BILLING CODE 7050-01-M

NATIONAL FOUNDATION ON THE ARTS AND THE HUMANITIES

Meeting of Opera-Musical Theater Advisory Panel

Pursuant to section 10(a)(2) of the

Federal Advisory Committee Act (Pub. L. 92-463), as amended, notice is hereby given that a meeting of the Opera-Musical Theater Advisory Panel (Challenge III Section) to the National Council on the Arts will be held on June 28, 1991 from 9 a.m.-5:30 p.m. in room 714 at the Nancy Hanks Center, 1100 Pennsylvania Avenue, NW., Washington, DC 20506.

Portions of this meeting will be open to the public from 9 a.m.-10 a.m. and 4:30 p.m.-5:30 p.m. The topics will be welcoming remarks, overview of Challenge III, and policy discussion.

The remaining portion of this meeting from 10 a.m.-4:30 p.m. is for the purpose of Panel review, discussion, evaluation, and recommendation on applications for financial assistance under the National Foundation on the Arts and the Humanities Act of 1965, as amended, including information given in confidence to the agency by grant applicants. In accordance with the determination of the Chairman of March 5, 1991, as amended, this section will be closed to the public pursuant to subsection (c)(4), (6) and (9)(B) of section 552b of title 5, United States Code.

Any interested persons may attend, as observers, meetings, or portions thereof, of advisory panels which are open to the public.

Members of the public attending an open session of a meeting will be permitted to participate in the panel's discussions at the discretion of the chairman of the panel if the chairman is a full-time Federal employee. If the chairman is not a full-time Federal employee, then public participation will be permitted at the chairman's discretion with the approval of the full-time Federal employee in attendance at the meeting in compliance with this guidance.

If you need accommodations due to a disability, please contact the Office of Special Constituencies, National Endowment for the Arts, 1100 Pennsylvania Avenue, NW., Washington, DC 20506, 202/682-5532, TTY 202/682-5496, at least seven (7) days prior to the meeting.

Further information with reference to this meeting can be obtained from Ms. Robbie McEwen, Acting Advisory Committee Management Officer, National Endowment for the Arts, Washington, DC 20506, or call (202) 682-6493.

Appendix C

Belt Air Advisory Committee Background of Members

Neutral Members

Mary Jo Jacobs, M.D., physician with a broad background in public health and mine health research issues.

Ragula Bhaskar, Ph.D., assistant professor of mining engineering in the Department of Mining at the University of Utah.

Diane Doyle-Coombs, mining engineer and former chairperson of the Pittsburgh section of the Society of Mining Engineers.

Raja Ramani, Ph.D., director of the Department of Mineral Engineering at Pennsylvania State University.

Lee Saperstein, Ph.D., professor and chairman of the department of mining engineering at the University of Kentucky.

Labor Representative

Shirley Clark, equipment operator who is also certified as an underground coal mine foreman in the state of Colorado.

Industry Representatives

Jack Holt, safety director at Consolidation Coal Company.

John Stevenson (Non-voting alternate), general manager of the ventilation department in the mining division of Jim Walter Resources, Inc.

Appendix D

List of documents distributed to Belt Air Advisory Committee Members

- Charter
- Notice of First Meeting
- Agenda of First Meeting
- Ground Rules
- Safety Standards for Underground Coal Mine Ventilation;
Proposed Rule
- Belt Entry Ventilation Review: Report of Findings and
Recommendations
- UMWA Testimony during public hearings on Ventilation proposed
rule re: § 75.350, § 75.351, and § 75.380
- Written UMWA comments on Ventilation proposed rule re:
§ 75.350, § 75.351, and § 75.380
- Thirty-nine written comments from members of the UMWA following
the public hearings on the Ventilation proposed rule
- Transcript of Belt Entry Ventilation Report Hearing
- MSHA's response to concerns raised at the Reston Hearing re:
Belt Entry Report
- Letter, Richard Trumka, UMWA to Lynn Martin re: Withdrawing
his organization's participation from the Advisory Committee
- Resumes of each member of the Advisory Committee
- Minutes of First Meeting
- Transcript of First Meeting
- Issues Developed by Advisory Committee at First Meeting
- Memorandum for Dr. Raja V. Ramani from Thomas J. Ward, Jr., re:
Statement of Policy - Section 242(c) Belt Air
- Notice of Second Meeting
- Agenda of Second Meeting

- "Known Cross Sensitivity to Other Gases at 20°C," Industrial Scientific Corporation [Note: This applies to the City Technology Co. sensor.]
- Chart, "Conveyor Belt Fires 1970 - 1988, Belt Air Not Used At Face," MSHA data
- Chart, "Conveyor Belt Fires 1970 - 1988, Belt Air Used At Face," MSHA data
- Chart, "Conveyor Belt Post BEVR Report," MSHA data
- Memorandum for BAAC Members from Edward J. Miller, DFO, with attached Chart of "Active Petitions for Modification, Air in the Belt Entry Permitted to Ventilate Working Places"
- Memorandum for Edward J. Miller, DFO, from William J. Francart, re: Belt Entry Fire Reports, with copies of three reports discussed in Mr. Francart's presentation to the BAAC
- "Effect of Ventilation on Conveyor Belt Fires," by Drs. Charles P. Lazzara and Frank J. Perzak
- "Impact of Entry Air Velocity on the Fire Hazard of Conveyor Belts," by Harry C. Verakis and Robert W. Dalzell
- BOM RI 9274, "Determining the Relative Toxicity and Smoke Obscuration of Combustion Products of Mine Combustibles"
- "A Review of World-wide requirements for fire-resistant conveyor belting," by A.E. Anderson
- "Conveyor Belt Flammability Studies," by Charles P. Lazzara and Frank J. Perzak
- "Conveyor Belt Flammability Tests: Comparison of Large-Scale Gallery and Laboratory-Scale Tunnel Results," by C.P. Lazzara and F.J. Perzak
- Letter, Mr. Thomas J. Rabbitt, UMWA to Ms. Patricia Silvey, MSHA, April 23, 1990, re: Comments on Belt Entry Review Report
- Letter, Ms. Linda Raisovich-Parsons, UMWA to Ms. Patricia Silvey, MSHA, May 17, 1990, re: Issues raised at public hearing regarding AMS
- Letter, Mr. Robert J. Scaramozzino, UMWA to Ms. Patricia Silvey, MSHA, May 17, 1990, re: Hearing Record on Belt Entry Ventilation Review Report

- Memorandum for BAAC Members from Edward J. Miller, DFO, re: Sample stipulations for modification of 30 CFR 75.326
- Letter, Ms. Linda Raisovich-Parsons, UMWA to Ms. Patricia Silvey, MSHA, May 17, 1990, re: UMWA position on ventilation of conveyor belt entries
- Summary of Citations submitted by the UMWA during Reston Hearing
- "Current Practice for Applications of Atmospheric Monitoring Systems," by William J. Francart and Edward J. Miller
- "Mine Ventilation Control by Using a Transition Diagram of Airflow Rate," by Yuusaku Tominaga and Yuuichi Umeki
- "Mine monitoring - Improving Protection and Productivity," by P. Worley
- BOM Information Circular 9311, "In-Mine Evaluation of Smoke Detectors," by G.S. Morrow and C.D. Litton
- "Determining the Integrity of Escapeways during a Simulated Fire in an Underground Coal Mine," by Robert J. Timko and R. Lincoln Derick
- "Pressurization of Intake Escapeways with Parachute Stoppings to Reduce Infiltration of Smoke," by Fred N. Kissell and Robert J. Timko
- "Relationships between Smoke and Carbon Monoxide and their Implication toward improved Mine Fire Detection," by C.D. Litton
- Video of "Escape from a Mine Fire"
- "How Smoke Hinders Escape from Coal Mine Fires," by F.N. Kissell and C.D. Litton
- "Evaluating those Factors that Influence Escape from Coal Mine Fires," by G.V.R. Goodman and F.N. Kissell
- "Important Factors for Escaping a Mine Fire," by Gerritt V.R. Goodman and Fred N. Kissell
- "Using Confirming Events to more Reliably Detect Coal Mine Fires," by Fred N. Kissell
- "Ranking the Factors that Impact Survival during Coal Mine Fires," by Fred N. Kissell, Robert J. Timko, and Charles D. Litton

- Letter, Gary J. Asher, UMWA to Patricia Silvey, MSHA re: Comments on Island Creek Coal Company's Dobbin Mine (M-89-13-C)
- "Atmospheric Monitoring Systems and their Existent Deficiencies," by Thomas J. Rabbitt
- Carbon Monoxide Inspection Procedures Handbook
- BOM Report of Investigations 9380 "Fire Detection for Conveyor Belt Entries," by Charles D. Litton, Charles P. Lazzara, and Frank J. Perzak
- "Relationships Between Smoke and Carbon Monoxide and Their Implication Toward Mine Fire Detection", by C.D. Litton
- An overview of Rel-Tek Corporation products
- Mine Monitor and Control System, designed with mining in mind Pyott-Boone Electronics
- MSA Dan System/Data Acquisition Network
- Corrected Minutes of Second Meeting
- Transcript of Second Meeting
- Selected documents from the record of a recent Petition for Modification case, UMWA vs. MSHA, (Southern Ohio Coal Company, Intervenor):

Proposed Decision and Order of the MSHA Deputy Administrator,

Decision and Order of the Administrative Law Judge Granting Petition for Modification,

Reply Brief of the UMWA before the U.S. Court of Appeals for the District of Columbia Circuit, and

Decision of the U.S. Court of Appeals for the District of Columbia Circuit.

- Concise summary of the petition for modification process
- "Research on the behavior of dust in ventilation," by M. Reinhardt
- "Dust Consideration When Using Belt Entry Air to Ventilate," by J.D. Potts and R.A. Jankowski

- "Experimental studies on dust dispersion in mine airways," by R. Bhaskar, R.V. Ramani and R.A. Jankowski
- BOM Information Circular 9114, "Dust Controls to Improve Quality of Longwall Intake Air," by John A Organiscak, Robert A. Jankowski and Johnathan S. Kelly
- Letter, Dr. James L. Weeks, UMWA to Ms. Patricia Silvey, MSHA re: Post-hearing comments concerning the relationship between exposure to respirable dust at working mine sections and use of belt entries to ventilate those sections
- Notice of Third and Fourth Meetings
- Agenda of Third Meeting
- Transcript of Third Meeting
- Minutes of Third Meeting
- Committee Working Document prepared by Dr. Jacobs and Dr. Bhaskar
- Safety Standards for Underground Coal Mine Ventilation; Final Rule
- Letter, response from Conspec Control Inc. to Ed Miller, DFO, re: Fifty-one problems listed by Mr. Asher in letter to Ms. Patricia Silvey
- Letter, Mr. Len Blatnica, MSA to Ed Miller, DFO, re: response to problems with atmospheric monitoring systems
- Letter, Mr. Michael B. McGonigle, Analytical Management, Inc., to Dennis Gibson, Goodyear re: results of laboratory analysis for conveyor belts submitted
- Fenaplast conveyor belting, World-wide summary. Conveyor belting safety test specifications, Issue No. 6 August 89
- Memorandum for Edward J. Miller, DFO, from Steven J. Luzik, re: Table of conveyor fires from 1978 - Present, that only involved burning of the belt or its associated components; percentage of belt entry fires that started on the belt; fires occurring on mains and sections; and percentage of reportable fires versus those which were not officially reported but for which a memorandum was issued.
- The following comments submitted after the belt entry ventilation report hearing:

Southern Utah Fuel Company
 United Mine Workers of America
 Cannelton Holding Company
 Pennsylvania Coal Association
 University of Missouri-Rolla
 Virginia Polytechnic Institute & State Univ.
 Arch of Kentucky, Inc.
 Pittston Coal Group, Inc.
 Shamrock Coal Company
 University of Missouri-Rolla
 Island Creek Corporation
 Bureau of Deep Mine Safety
 Transmitton Inc.
 Nancy L. Dorset (Miner)
 Congressman Alan B. Mollohan
 Rochester & Pittsburgh Coal Company
 American Electric Power Corporation
 Kentucky Coal Association
 NIOSH
 Consolidation Coal Company
 American Mining Congress
 Bituminous Coal Operators' Association
 National Coal Association
 Occupational Safety and Health Law Center
 Donald W. Mitchell, P.E.
 Cyprus Minerals Company
 Kerr-McGee Corporation
 Congressman Joseph Gaydos
 BOM

- "Standard Test Criteria for Evaluation of Underground Fire Detection Systems," Factory Mutual Research Corporation, BOM
- UMW comments on the "Belt Entry Ventilation Review: Report of Findings and Recommendations"
- "Key Cultural and Organizational Factors Related to Work Performance," by James D. Bennett, Ph.D.
- "Trends In Coal Mine Dust Exposures For Longwall Miners 1981-1987," NIOSH
- "Belt Air - Dust Issues," by Robert A. Haney, MSHA Dust Division
- "Update on Stage Loader Dust Control in Longwall Operations," by N.I. Jayaraman, R.A. Jankowski and J.A. Organiscak
- Memorandum for Dr. Lee W. Saperstein, Advisory Committee Member, from Jon C. Yingling re: Preliminary Analysis of Respirable Dust Data

- Agenda of Fourth Meeting
- Transcript of Fourth Meeting
- Minutes of Fourth Meeting
- Letter, William L. Grosshandler, National Institute of Standards and Technology to Edward J. Miller, DFO, re: Review of Bureau of Mines Report Investigation of 9380
- Letter, Edward J. Miller, DFO to Dr. Jacobs, Chairperson, forwarding a copy of Dr. Grosshandler's letter for her review
- Letters, Edward J. Miller, DFO to BAAC members forwarding a copy of Dr. Grosshandler's letter for their review
- Letter, response from Rel-Tek Corporation, to Ed Miller, DFO, re: Fifty-one points listed by Mr. Asher in letter to Ms. Patricia W. Silvey
- Notice of Fifth Meeting
- Agenda of Fifth Meeting
- Transcript of Fifth Meeting
- Minutes of Fifth Meeting
- Committee Working Document re: Training subcommittee draft #1
- Committee Working Document re: Training subcommittee draft #2
- Committee Working Document re: Fire safety subcommittee draft #3
- Letter, Hamid N. Maleki, J.F.T. Agapito and Associates, Inc., to Tom Paluso, Soldier Creek Coal Company, re: gate pillar geometry for multiple-seam longwall mining
- "Rock mechanics research decreases longwall bump potential at a southern Appalachian coal mine," by T.M. Barton, A.A. Campoli and M. Gauna
- "Characterization of chain pillar stability in a deep western coal mine - case study," by M.J. DeMarco, J.R. Koehler, P.H. Lu
- "Gate road layout design for two-seam longwall mining," by H.N. Maleki, J.F.T. Agapito, M. Wangsward, and J. Cort
- "Escape from a Mine Fire Instructional Guide" U.S. Department of Labor, 1990

- "Ground control evaluation of 101(c) petition for modification of 30 CFR 75.326 Soldier Canyon Mine," by Richard R. Pulse, geologist MSHA Safety and Health Technology Center
- "Two-Entry Longwall Gate Road Experience In A Burst-Prone Mine," by J.F.T. Agapito, H.N. Malcki, and M. Moon
- Chart, Injuries and Fatalities Encountered in Coal Mining, 1978 to 1990, Source: Injury Experience in Coal Mining, Informational Reports, published annually by MSHA, 1978 to 1990
- Overheads used by J.F.T. Agapito during his presentation
- Providing Pressurized Intake Escapeways for Mine Utilizing Belt Intake Air
- Ground Control and Fire Accident Reports submitted by Industry
- "Two-Entry Mining," by Dave D. Lauriski
- Notice of Sixth Meeting
- Agenda of Sixth Meeting
- Memo from Mr. Lucik re: Belt Fires (shows location of belts)
- Transcripts of Sixth Meeting
- Minutes of Sixth Meeting
- Dr. Ramani's draft outline regarding escapeways
- Memo and draft working document regarding the final report
- Final Report Working Document #1
- Final Report Working Document #2
- Letter, A.E. Anderson, Fenaplast, to Edward J. Miller, DFO, re: Conveyor Belting--Development of Safety Standards
- Committee Working Document re: Escapeway Subcommittee Draft #1
- Committee Working Document re: Escapeway Subcommittee Draft #2
- Committee Working Document re: Escapeway Subcommittee Draft #3
- Letter and attachments, Richard W. Niemeier, NIOSH, to Dr. Mary Jo Jacobs, Chairperson, re: Necessity of monitoring respirable dust levels associated with conveyor belt entries used as intake aircourses

◦ Brief of Cyprus Emerald Resources

Submissions by the United Mine Workers of America (UMWA) --

- Article on Longwall installations from the Longwall Census
- Initial review of the Belt Air Advisory Committee's Consensus Recommendations and transcripts of meetings by UMWA
- Memorandum for Belt Air Advisory Committee from UMWA, Department of Occupational Health and Safety re: Conditions found in belt conveyor entries
- Memorandum for BAAC, from UMWA, Department of Occupational Health and Safety re: Coal Dust and/or Methane Ignitions
- Memorandum for BAAC, from UMWA, Department of Occupational Health and Safety re: Effects of Belt Entry Air Velocity on Fire Growth Rates, Intake Escapeway, Float Coal Dust and Fire Detection Systems
- Memorandum for BAAC, from UMWA, Department of Occupational Health and Safety re: Performance Standards for Atmospheric Monitoring Systems
- Index: Rulemaking Atmospheric Monitoring Systems
- Index: Relevant Data Pertaining to Belt Air Use Not Previously included in the Rulemaking Record
- Comments submitted by UMWA on 75.350 Belt Conveyor Entries
- Comments submitted by UMWA on 35(a) Belt Entry Conditions
- UMWA comments on Belt Entry Ventilation Review 2/9/90 Report of Findings and Recommendations of MSHA
- UMWA testimony at the Public Hearing on the Belt Entry Ventilation Review Report
- Comments submitted by UMWA on the Belt Entry Ventilation Review Report relevant to AMS
- Comments submitted by UMWA on 75.351 AMS
- UMWA testimony on AMS at Belt Entry Ventilation Review Report public hearing (Reston)
- Letters to Patricia W. Silvey, MSHA, from members of UMWA, re: May 17, 1990

- Forwarding copies of data referenced in their testimony at Reston hearing
- Memorandum for Belt Air Advisory Committtee from UMWA, Department of Occupational Health and Safety re: Cyprus Emerald Resources, Case No. 83-MSA-17
- Selected documents from the record of a recent Petition for Modification case, Cyprus Emerald Resources vs. UMWA, (MSHA, Party-in-Interest):

Decision and Order of the Assistant Secretary for MSHA,

Decision of the U.S. Court of Appeals for the District of Columbia Circuit,

Supplemental Decision and Order on Remand by Assistant Secretary for MSHA,

Proposed Decision and Order of the MSHA Deputy Administrator relative to the Ohio Valley Coal Company,

BOM Report of Investigations 9380 "Fire Detection for Conveyor Belt Entries"

Brief of UMWA in the Cyprus Emerald Mine Case

- Comments by UMWA on 75.380 Escapeways
- Comments by UMWA on 75.380 Escapeways; Bituminous and Lignite Mines
- Comments by UMWA on 75.381 Mechanical Escape Facilities
- Comments by UMWA on 75.382 Escapeway Maps and Drills
- Comments by UMWA on 75.382 Mechanical Escape Facilities
- Comments by UMWA on 75.383 Shortwall and Longwall Travelways
- Comments on Escapeways submitted by the UMWA relative to the Belt Entry Ventilation Review Report
- Comments by UMWA on 75.383 Escapeway Maps and Drills
- Comments by UMWA on 75.384 Longwall and Shortwall Travelways
- UMWA Testimony on Escapeways at the Public Hearing on the Belt Entry Ventilation Review Report

Submissions by UMWA (continued)

- ° The Wilberg Mine Disaster: A UMWA Report
- ° Memorandum for Belt Air Advisory Committtee from UMWA, Department of Occupational Health and Safety re: Escapeways
- ° Memorandum for Belt Air Advisory Committtee from UMWA, Department of Occupational Health and Safety re: Legislative History of Sections 303(Y) and 317(F) of the Federal Coal Mine Health and Safety Act of 1969 on Performance Standards for AMS
- ° Memorandum for Belt Air Advisory Committtee from UMWA, Department of Occupational Health and Safety re: Report on AMS Survey of 25 Mines
- ° Copies of UMWA's original questionnaires returned in 25 Mine Survey
- ° Exhibit #1 Letter for Robert Scaramozzino from Ronald Moats, UMWA re: Arkwright No. 1 Mine, Petition for Modification
- ° Exhibit #2 Memorandum for All Interested Parties from UMWA, Safety Committee re: Response to Alarms from C.O. Monitoring Systems
- ° Statement from Jack Holt: Rationale for not affirming Recommendation Number 3
- ° Letter for Dr. Raja Ramani from Edward J. Miller re: Signature for Recommendation Number 5

Appendix E

Belt Air Advisory Committee Subcommittee Membership

Atmospheric Monitoring System Subcommittee

Dr. Mary Jo Jacobs
Dr. Ragula Bhaskar

Fire Safety Subcommittee

Mr. Jack Holt
Ms. Diane Doyle-Coombs
Mr. John Stevenson

Training Subcommittee

Dr. Lee Saperstein
Ms. Shirley Clark

Escapeway Subcommittee

Dr. Raja Ramani
Dr. Ragula Bhaskar
Mr. Jack Holt
Ms. Diane Doyle-Coombs

Appendix F

Belt Air Advisory Committee

Issues For Discussion by the Committee Grouped by Major Topics

Major Topic 1: Mine Ventilation Systems and Escapeway Design (Birmingham Meeting*)

Velocities vs. flame spread
(Minimum/maximum)

Escapeway ventilation
Simulation studies
Impact of minimum velocities on total mining system
Dust vs. velocity
Minimum/maximum
Conveyor/air

Geologic conditions
Mine resistance/ventilation capacity
Methane liberation
Mine layout, number of entries

Major Topic 2: Coal Mine Fire Safety with Attention to Belt- Conveyor Entries (Pittsburgh Meeting*)

Fire protection engineering
Fire prevention
Monitoring systems
Sensors
Interpretation of data
Background/trigger levels
Redundancy/reliability
Response/reaction time
Survey of existing systems
Belts
Combustion products
Toxic fumes
Flammability
Standards/specifications
Velocity vs. flame spread
Fire fighting and evacuation plan
(materials/standard)
Alert/alarm
(records/response)
System redundancy
System safety analysis
Risk evaluation

Major Topic 3: Education, Training & Management (Lexington Meeting*)

Company procedures/regulatory
Training/certification/qualification
(type of activity/occupation)

Major Topic 4: Health Ramifications Associated with the Use of Belt-Entry Air (Lexington Meeting*)

Dust, (respirable, bronchial, diesel particulate)
Safety and health
Dust (combustion products)
Toxic fumes
Risk evaluation
Dust exposure for face/belt/intake
Dust vs. velocity
 Minimum/maximum
 Conveyor/air

Major Topic 5: Monitoring Systems for Atmospheric Integrity (Birmingham Meeting*)

System maintenance/reliability
Sensors
Interpretation of data
Background/trigger Level
Redundancy/reliability
Response/reaction time
Alert/alarm
 (records/response)
Risk evaluation

Issues Relevant to All Topics (considered to apply to each Major Topic area)

Technical advancements
World-wide experience
Risk/benefits analysis of all alternatives
Best available vs. best practicable technology
 (criteria)

Implementation of technology
Dependence on trained workers
Performance vs. Specifications: outcome vs. procedure

* Discussion often lasted into subsequent meetings.

**NIST**

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899

June 24, 1992

Edward J. Miller
Belt Air Advisory Committee
Mines Safety and Health Administration
4800 Forbes Avenue
Pittsburgh, PA 15213

Dear Mr. Miller:

I have had a chance to read through the report by Litton, Lazzara and Perzak on conveyor belt entry fire detection (BoM RI 9380), and have a number of questions stemming from my unfamiliarity with coal mining practices and equipment. My biggest concern is with accepting the data as representing the worst-case conditions, as is requested by the authors in the conclusions section of the report. For example, if the ventilation air were to drop below its designed value, eq. (20) indicates that a detector remote from the source would take an increasingly longer time to sense the growing fire. The estimate of flame spread on the two belts tested is based upon them being horizontal and stationary. Wouldn't they normally be slanted? If so, the spread rate would be greatly enhanced. What happens when the belt is moving? Local velocities around the smoldering or burning coal would be different from the mean air flow across the tunnel. It would be the local velocities that control the growth rate of the coal fire, not to mention the spread rate of the burning conveyor.

The authors have much more experience than I in smoldering and flaming coal beds, and have established a relationship between the CO and smoke which is likely to be produced in a fire. I would trust their judgement regarding the generalization of the limited number of experiments presented in this report, but need more convincing that the ignition scenarios they present in fact lead to conservative estimates of the time available for detection. A discussion of the uncertainty in their own data, standard deviations on the measurements, and comparison between replicated experiments would be useful. A first order dependence of smoldering rate with external velocity is a reasonable model; once flaming occurs, however, the way in which the rate of combustion changes with external velocity is not well known.

I don't agree with the authors' reasoning for the factor of one half used in eq. (18). It is true that on the average, the distance between the fire and sensor would be one half the detector spacing; however, since the ventilation flow is in only one direction, a detector just upstream of a fire may never detect it because the combustion products would be convected downstream. When one considers that the combustion products are being continuously transported downstream (rather than a plug flow of accumulated products as assumed in eqs. (19) and (20)), a transient transport time is more properly written as follows:

$$t_i = l_s/60v_o [1 - \exp(-v_o t/l_s)].$$

This equation would yield a coefficient different from 1/2, ranging from 1.0 for long transport times to zero for short transport times.

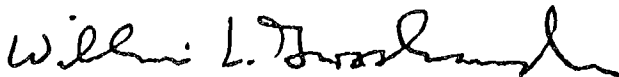
The result is that the nomographs in Figures 7 and 8 should be conservatively labeled 500 ft and 1000 ft, respectively. Otherwise, the relation among the air flow velocity, the cross-sectional area, and the detector sensitivity appears reasonable.

The effect of crosscuts on detector spacing is given in Appendix D. I agree that eq. (D-4) is a conservative estimate of the effective cross-section; but the form chosen for eq. (D-5) appears somewhat arbitrary. Do the authors have evidence that a square root relationship is reasonable? The treatment of parallel entries and air splits are handled in an appropriate manner.

To summarize, the authors appear to base their design equations on past experience and a thorough knowledge of the belt entry fire hazard. Without their collective knowledge, I must rely upon what is contained in RI 9380, and am therefore unable to embrace some of the empiricism adopted by the authors. In particular, I would recommend that the nomographs be modified as discussed above (ie., divide l_s by two) to ensure that the conveyor belt entries are adequately protected.

I would be happy to discuss these issues with you or Dr. Litton, and hope that these comments can be of use to you.

Sincerely,



William L. Grosshandler
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